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# USSR Report

SCIENCE AND TECHNOLOGY POLICY

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11 April 1986

# USSR REPORT

## SCIENCE AND TECHNOLOGY POLICY

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## ORGANIZATION, PLANNING AND COORDINATION

### SIMULATION MODEL FOR VARIANT CALCULATIONS OF SECTORIAL PLAN

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 11, Nov 85 pp 11-16

[Article by A. Shurabekov, chief of the Construction Materials Industry Department of the Kazakh SSR State Planning Committee, A. Rodin, chief engineer of the Scientific Research Institute of Automated Systems of Planning and Management attached to the Kazakh SSR State Planning Committee, V. Pesin, deputy director of the Scientific Research Institute of Automated Systems of Planning and Management, and L. Titke, chief of the Department of the Automation of Industrial Planning of the Scientific Research Institute of Automated Systems of Planning and Management: "Variant Calculations of the Plan With the Aid of a Computer"; first paragraph is NARODNOYE KHOZYAYSTVO KAZAKHSTANA introduction]

[Text] This article is a continuation and logical development of the articles published in the journal NARODNOYE KHOZYAYSTVO KAZAKHSTANA in 1983 (No 3, No 12), in which individual aspects of the improvement of the planning of the sector were examined. A set of variant calculations, which are made on the basis of models of the simulation type, which unite the entire plan of physical production and capital construction of the sector, is presented in the new article being offered to the readers. Examples of the testing of models and real calculations of the draft of the plan on the basis of the example of the construction materials sector are given and results are cited. A similar principle of the construction of a general simulation model is also being used in other industrial subsystems of the Automated System of Plan Calculations of the Kazakh SSR State Planning Committee.

The central unit of management--planning--is called up (at the level of plans) to ensure the soundness, balance, and comprehensiveness of the development of the national economy. However, it is not possible to achieve these goals by traditional methods. Life has shown quite convincingly that today the changeover to planning on the basis of mathematical economic methods with the use of electronic computer technology is necessary. And such work has already begun.

It should be emphasized that economics has to do with those poorly formalized mathematical fields, in which the quality of decisions is restricted not by the possibilities of the computer, but by the quality of the models and the degree of their approximation of real processes. Specialist know that today

the class of simulation models is considered one of the promising ones. Such models are computer analogues of economic objects and make it possible to replace to some extent the economic experiment (which is usually difficult to conduct) with computer modeling.

It is important to note that modern computers and their operating systems and packages of applied programs afford the experimenter, for example, the economist, the opportunity to conduct a dialogue with the computer from his terminal, an alphanumeric or graphic display. (Such a terminal, which has been transferred to the workplace and has access to sufficient computer resources, is called an automated workplace (ARM).)

The essence, however, consists not in the elementary automation of some computing operations. And not only in the fact that the use of simulation models improves the quality of the planning decisions being made and the entire process and procedure of planning change radically.

Thus, whereas previously such stages: the obtaining of data, the calculation of the indicators of the plan, analysis, and decision making, were singled out as independent stages in the process of drafting the plan, now interactive variant planning has become a reality and is feasible in practice.

During the period of the preparation of the draft of the plan on a simulation model the last two stages can be repeated over and over, until satisfactory values of the plan indicators are obtained. It is clear that at each repetition the goal of the experiment can change, while the data can vary both quantitatively and in their composition.

Here the task of the experimenter is to study the reaction of the economy of the sector being planned to different sets of conditions and regulating factors, as well as to changes of the numerical values of the initial data.

The transition from the simple to the complex and the gradual obtaining of a model, which is sufficiently equal to the economy of the sector, are the general principle of the development of the simulation model. The model of the planning of the sector is constantly being broadened and extended. Even the problems, which are solved initially by the direct calculation method, are gradually being changed over to iterative and optimization models.

Iteration is the repeated application of a mathematical operation to changed data for the gradual approximation of the needed result. When solving economic problems on a computer several types of iterations are encountered:

--in algorithms, which realize optimization and balance sheet methods, the check of the condition of convergence and the transition to the next iteration or the exiting of the algorithm are carried out automatically;

--in algorithms with the use of dialogues the condition of convergence is a set of informal attributes.

The person making the decision analyzes the results of the next iteration and makes a decision on concluding the calculations or makes adjustments in the

initial data, and the calculations are repeated. Both types of iterations are encountered in the algorithms being used by us in planning the construction materials industry.

In the statements of General Secretary of the CPSU Central Committee M.S. Gorbachev at the meeting of the party and economic aktiv in Leningrad and at other conferences the need for the quickest use of the available reserves of the intensification of production on the basis of the achievements of scientific and technical progress is indicated. In the sector being examined by us (the construction materials industry) these reserves lie in the more complete use of production capacities, in the decrease of transportation costs by the rationalization of transportation; the optimization of the attachment of consumers to suppliers; in the saving of capital investments owing to the choice of the best versions, in such expansion, renovation, and construction of enterprises, which raise the efficiency of the sector to a new level. Here the coefficients of the utilization and assimilation of capacities, the structure of interchangeable materials, the delivery routes of raw materials and finished products, the levels of the capacities of enterprises which are being built, renovated, and expanded, and so on are the variable indicators.

The choice of an efficient version of the plan is not easy. Thus, when examining the problem of the optimization of the development and production of local construction materials, the economist deals with 10 types of interchangeable wall materials, 6-8 types of raw materials; the number of suppliers at times reaches 500, while the number of consumers reaches 200. It is already clear from this that it is impossible to calculate and compare manually all the possible versions of the plan. A computer, which works with a speed of 200,000 operations a second, spends on this work about 20 hours, implementing the well-developed algorithms of the modified simplex method and the branch and bound method by means of the LP ASU standard package of applied programs.

The simulation model in simplified form is presented as a graph in the diagram [diagram not reproduced]. The basic input information is concentrated in the lower part of the graph. As is evident from the diagram, the model is a set of complexes and problems, which are united by direct ties and feedbacks, which corresponds to the iterative calculations of the draft of the plan. The direction of the movement of the information and the sequence of the solution of the problems depend on the goal of the corresponding version of the calculation. In the subsystems the variant calculations are made by three methods.

1. Variant calculations by means of changes in the initial data when proceeding to the next iteration;
2. Variants of the algorithm which are based on various procedural premises;
3. Variant calculations in accordance with models of optimal planning.

Variant calculations are necessary for the assurance of an adequate degree of balance of the plan indicators and the making of the optimum planning decisions. The direct sequence of the solution of the problems of the

subsystem corresponds to the increase of the number of procedures in the diagram and the movement of information from the bottom up. The procedures of the coordination of the final (26 or 34) or intermediate (6, 11, 13, 15, 19, 23, 29, 32) results give rise to possible alternatives in the chain of calculations: continuation forward or a shift (return) to a new step of iteration to the preceding complexes.

In the process of drawing up the draft of the plan it is possible to single out conditionally small and large iteration circles and five loops of optimization. Let us agree on the following definitions of these concepts. By optimization there are understood both the solution of the problems with the use of mathematical economic methods of optimization (linear programming and others) and the choice of the best (and, therefore, optimum) solution from several different versions of the values of the plan indicators. Moreover, in case of the further development of the subsystem the solution of the problems of the last type will be accomplished by means of multicriterion optimization models.

Let us call the sequence of procedures, which includes one complex of calculations with the subsequent analysis of the results and the return to the solution of the same complex (for example, the sequence of procedures 7, 14, 15, 8), a small iteration circle.

A large iteration circle includes several complexes of calculations and returns, after the analysis of the results, to more than one complex back (for example, the sequence of procedures 7, 12, 13, 22, 23, 8).

The loop of optimization is the aggregate of computing and logical procedures, which ensure the formulation and making of the optimum decision on one or several plan indicators. The loop of optimization is characterized by the closer interconnection of the problems and a large number of small iteration circles around the nucleus of the loop (the central complex of problems).

In case of the long-range planning of the sector the most complete meeting of the need of the national economy for the products of the sector given the available resources is the basic requirement. This ultimate goal in each of the loops of optimization is realized by its subgoal.

Loop 1. The goal is the determination of the optimum investment process. The basic input information is the reports for the base period and the plan of the current period, the standards of transportation, production, and capital expenditures by versions of the renovation, retooling, expansion, and new construction of enterprises of the sector, and the regionalized need for basic types of materials for the period being planned. The basic output indicators are the list of projects, which are being included in the plan of capital construction during the period being planned, and the necessary amounts of capital investments and construction and installation work, the placement of capital and capacities into operation. Two complexes of problems make up the nucleus of the loop.

1. The optimization of the development and distribution of enterprises of local construction materials (ORR)--procedure 17. In case of the solution of



that complex the total current production, transportation, and adjusted capital expenditures on the renovation, expansion, and new construction of enterprises are minimized.

2. The determination of the amount and structure of capital investments and construction and installation operations, the placement of capacities and fixed capital into operation--procedure 18.

The list of objects for inclusion in the plan of capital construction is formed in accordance with two versions of the model:

--the determination of the amounts of capital investments for the meeting of the complete need for local construction materials;

--the determination of the optimum placement of capacities into operation given restricted limits of capital investments.

Loop 2. The nucleus of the loop is the elaboration of the planning balance of production capacities. The calculations of the technical and economic substantiation and the anticipated fulfillment of the production plan, as well as the reporting balance of production capacities and the plans of the current period are the base information. The basic output indicators are determined subject to the versions of the calculation. Optimization is achieved here by the repeated making of calculations in accordance with the different versions of the algorithm.

Version 1. The potential volume of output of products given the already coordinated indicators of the placement into operation, increase, and withdrawal of capacities is determined. The following means of determining the planning coefficient of the utilization of capacities are envisaged in the algorithm:

--on the basis of the growth rate of the indicator during the base period;

--at the level of the intensity which was used in the calculations for the five-year plan;

--the maximum utilization of capacities with allowance made for the necessary reserve.

It is possible to make the calculations in accordance with this version of the algorithm both at the level of the republic as a whole and by individual ministries, departments, or enterprises with the subsequent aggregation of the results.

Version 2. This version of the algorithm, just as version 1, is based on the planning balance of capacities, but the determination of the intensity of the utilization of capacities, which is necessary during the planning period, for the assurance of the set volume of production is the goal of the calculation. The amount of output being produced can be given by:

- a) the need for the products of the sector;
- b) the control figures or assignments of the five-year plan;
- c) the balancing of the volumes of the output of products with the material resources.

Version 3. The goal of the version is to determine the magnitude of the additional increase of the capacity at operating enterprises by means of organizational and technical measures or their renovation for the assurance of the given output of products.

Version 3 is especially urgent for the production of local construction materials, in which the underutilization of capacities is frequently explained by the existence of a large number of bottlenecks (obsolete equipment, by the shortage of spare parts, and other factors). The viewing of this version as an independent one is also due to the possibility of a more rapid return with fewer expenditures of assets and without the enlistment of contracting construction organizations. Here the problem is frequently solved by the allocation of new, more productive equipment.

Version 4. The goal is to determine the magnitude of the additional need for capacities for the assurance of the set volume of production by the construction of new enterprises and the expansion of operating ones.

The analysis of the output indicators of the planning balance of capacities can lead to different conclusions:

- a) the results are satisfactory, for the continuation of the calculations proceed to the third loop of optimization;
- b) it is possible to improve the plan indicators by the adjustment of some data and additional iterations within the same loop or with the enlistment of the calculations of the technical and economic substantiation and (or) the anticipated fulfillment of the plan;
- c) the improvement of the planning decisions should be obtained by the optimization of the development and distribution of enterprises in the first loop, in which the limits of capital investments in the sector are coordinated with the need for the increase of the capacities for the output of products.

The shift in accordance with the diagram to some computing procedures or others is also made in conformity with these conclusions.

Loop 3. The goal is to formulate the draft of the plan of the output of products of the sector (with respect to the subordinate group or territory) and to compare the planned volumes of production with the need. The optimization of planning decisions in this loop at present is being achieved by means of iteration and the coordination of the amount of output being produced by the different producers with the need for it and with the material

resources being allocated. An unsatisfactory balance of production and need leads to two conclusions:

--one should agree to a certain shortage of products, since all the possibilities of the increase of their production have been exhausted;

--one should reconsider the possibilities of increasing the production volume.

The basic indicators of the production plan in physical terms are coordinated with the manpower, material, and financial resources.

Loop 4. The goal is to determine the value indicators of the production plan and the efficiency of the use of the fixed capital of the characteristic ministry. The improvement of the output indicators is accomplished by repeated iterations with more accurate data. A change of the volume of commodity production is possible due to:

--a change of the structure of production;

--an increase of product quality, that is, an increase of the proportion of products of the highest quality category, which is reflected in the change of the average wholesale prices.

An increase of the volume of the standard net output is achieved by means of the same factors. In case of coordinated volumes of production in physical units of measurement (loop 3) in loop 4 the volume of the commodity, sold, and standard net output within the allocated limits and assets for manpower, material, and financial resources is maximized.

Loop 5 is the territorial breakdown of the plan of the production of local construction materials for the republic and the draft of the plan of the distribution of materials. Under the conditions of an acute shortage of the majority of construction materials efficient distribution is an important unit of the saving of material resources. The iterative optimization calculations take into account the level of supply with the products of the sector, the needs of the oblasts, and the direction and cost of the transportation of materials.

Thus, a technology of drawing up the draft of the plan by means of variant calculations on a computer with respect to many planning functions and procedures is proposed. The combination of tasks is achieved in an automated mode and through the nonformalized operations of the examination, coordination, and making of decisions.

Experience has shown that by means of the methods and means of the automated system of planning calculations, which are used in the above-described technology, a better balance of the plan indicators and their more thorough study and substantiation are achieved and the quality of the plans and the standards of planning increase.

A plan, which meets to the maximum degree the need for the products of the sector, is found as a result of variant calculations. It is natural that in

case of short-term planning this is achieved by the assignment of higher coefficients of the utilization of operating capacities and the capacities being placed into operation. However, it is necessary to be convinced that the more intense plan is actually feasible for specific enterprises. For the conditions of their work, the state of the production equipment, and the availability of raw materials, energy, transportation, and supply with manpower can differ substantially.

Consequently, it is necessary to make an analysis of the intensity and feasibility of the plans. We proposed a method, which takes into account the above-named conditions and is based on the comparison of the intensity of the plans with respect to the index of labor productivity at the given enterprise and ones similar to it in the sector (subsector). The comparison of these indices makes it possible to judge the real possibilities of the fulfillment of the plan assignments.

In case of long-range planning the possibilities and means of meeting the need for the products of the sector broaden substantially. The development of production and the increase of the output of products can be ensured not only by operating capacities, but also by their expansion and renovation and the construction of new enterprises. Thus, the variant calculations of the optimum development of the production of local construction materials for the future showed that the shortage of wall materials comes to about 30 percent and for the complete meeting of the need requires the expansion of production at 19 plants and the construction of 34 new ones.

However, owing to limitations on capital investments additional versions of the plan were calculated. In one of them (which corresponds to the limits of capital investments, which were allocated for the given subsector) eight expanded and four new enterprises were included in the optimum arrangement. Here the number of objects, which are liable to renovation and retooling, came already to 67 percent. This corresponds to the new investment policy, in case of which not less than 50 percent of all the capital investments should be channeled into the retooling and renovation of enterprises.

In speaking about the making of variant calculations of the plan, it is also impossible to evade the question of the economic efficiency of the automated system itself. Therefore, we will examine here two sources of the possible economic impact.

The first of them, which is called the direct economic impact, stems from the advantages of the computer processing of information as compared with manual processing. The amount of information in case of variant planning significantly exceeds the minimum necessary amount which is sufficient in case of the traditional formulation of the draft of the plant. Detailed information on the sector, its individual enterprises, the versions of their renovation, expansion, and retooling, as well as on the consumers, their location, the transportation networks, and the transportation rates is needed here. Here the amount of input information when formulating the annual draft of the plan for the sector in question exceeds 1 million characters. The computer time spent on the calculation of 1 version is 30-40 hours, while the cost of computer processing is about 5,000 rubles..pa

In case of the manual processing of the same amount of information the expenditures will come to 20,000 rubles. Consequently, the direct economic impact is about 15,000 rubles per cycle of calculations of the plan.

Thus, the direct impact from computer data processing already covers the current expenditures. However, the basic impact consists in the possibility of the calculation and the analysis of many versions of the plan of production and capital construction in the sector and in the choice of the best version. This impact originates in the sphere of physical production, that is, in the national economy as a whole, and it is customary to call it the indirect impact.

Let us explain this on the basis of two examples for the sector the construction materials industry. The calculations showed that the economic impact, which stems from the choice of an efficient version of the development and distribution of the production of wall materials for the future and the attachment of consumers to suppliers, comes to about 6 million rubles. In case of the complete implementation of the plan the meeting of the need for the products of the sector and the substantial decrease of capital investments as compared with the plan, which was calculated without the use of a computer, will be ensured.

The second example pertains to the improvement of the use of operating capacities in case of annual planning. The made variant calculations showed that in case of the varying within permissible limits of the values of the coefficients of the utilization of operating capacities and the coefficients of the assimilation of the capacities being placed into operation the intense plan as compared with the initial draft of the plan can ensure the output of additional products of local construction materials in the amount of 1.2 million rubles. The estimation of the rate of recovery of all the both current and capital expenditures, which are attributed to the given sectorial subsystem, on the machine processing of information of a computer showed that they are recovered in less than a year.

Thus, the set of variant calculations in accordance with models of the simulation type can serve as an effective tool, which makes it possible to identify and implement through the plan the potential possibilities and reserves of production.

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## ORGANIZATION, PLANNING AND COORDINATION

### FORECASTS, LONG-RANGE PLANS OF SCIENTIFIC, TECHNICAL PROGRESS

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 10, Oct 85 pp 3-12

[Article by academician of the Ukrainian SSR Academy of Sciences N. Chumachenko (Donetsk): "The Forecasting and Long-Range Planning of Scientific and Technical Progress" (\*) (The article is a paraphrase of a report at the plenum of the Republic Board of the Economic Science Society, which was held in Donetsk on 18 May 1985)]

[Text] The April (1985) CPSU Central Committee Plenum formulated the concept of the acceleration of the socioeconomic development of the country on the basis of scientific and technical progress. The decisive role of scientific and technical progress in the solution of the immediate and long-range problems of development was emphasized in the report of General Secretary of the CPSU Central Committee M.S. Gorbachev at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress and in other speeches of his. "Today, when the party is heading toward the 27th congress, when the program documents are being prepared, it is important to realize that we cannot do without the acceleration of scientific and technical progress and without revolutionary changes in the intensification of the economy." (Footnote 1) (M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii" [A Vital Issue of Party Economic Policy], Moscow, Politizdat, 1985, p 7)

In this connection new tasks are arising for the Economic Science Society, especially for its oblast and primary organizations, which unite the large forces of economists of enterprises and organizations, higher educational institutions and scientific institutions. Let us examine several of them.

Among the urgent tasks, which are connected with the acceleration of scientific and technical progress, a special place belongs to forecasting and long-range planning. The exceptional importance of studies of the prospects of the economic and social development of our society on the basis of the acceleration of scientific and technical progress stems from many factors.

First, at the achieved level of the development of the productive forces the acceleration of scientific and technical progress is one of the most important conditions of the improvement of the functioning of the entire economic potential. Accordingly the system of the management of scientific and

technical progress is also becoming one of the most important components of the entire system of the planned management of the economy. It is obvious that the accomplishment of the task of the efficient management of scientific and technical progress without a clear idea of its prospects is impossible.

Second, the development of the economy depends to a greater and greater degree on the implementation of large-scale plans, which with respect to the time of implementation go beyond one or two five-year plans. The examples of such plans are well-known. The cases of the significant decrease of the return of the spent assets and resources in those instances, when the peculiarities of the future period are taken inadequately into account, are also well-known.

The increase of the influence on the development of the national economy of resource limitations, including demographic and ecological limitations, should also be noted. Only sound forecasts are capable of decreasing the negative effect of the limitedness of resources and of taking it into account when drawing up national economic plans. Thus, forecasts, just as long-range plans, under present conditions are becoming one of the most important components of the entire system of management and planning. In turn, the utmost improvement of forecasting practice is a vital factor of the improvement of the entire system of the planned management of the development of the economy. An entire set of questions, which govern the development of our society, should be settled within the framework of the formulation of forecasts. The content of this work is determined by the strategic aims of the party with respect to the most important aspects of economic and social development.

In the report at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress M.S. Gorbachev, in specifying the place and role of the USSR State Committee for Science and Technology, indicated: "Without replacing either planning organs or ministries, it should focus the main attention on forecasting, the choice and substantiation of the priority directions of the development of science and technology, and the formation of a reserve of research and development as the basis for the making of advanced planning decisions. The Comprehensive Program of Scientific and Technical Progress should serve this." (Footnote 2) (M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii," p 24) The Comprehensive Program of Scientific and Technical Progress, which is being formulated for 20 years, is not only a component of the existing system of forecasting and long-range planning, but also the foundation, basis of this system. The availability of a clear strategic concept for the future depends in many ways on the quality of its formulation and the substantiation of the decisions being incorporated in it.

If one evaluates the problems, which it is necessary to solve during the formulation of the comprehensive program, one should note their diversity and difficulty. As a whole all the problems, which society has to solve, should be reflected to one degree or another in this document. Among them first of all are the forecasts of the basic directions of scientific and technical progress in the sectors of the national economy and the scale of its introduction in social production. Moreover, the breakdown of resources by directions of scientific and technical progress and the influence of changes

in equipment and technology on production efficiency and the structure of the economy should also find reflection in the comprehensive programs.

The measures on the improvement of the economic mechanism, which ensure the implementation of the long-term strategy of economic, scientific, technical, and social development, are one of the most important components of the comprehensive programs. And, finally, the comprehensive program is called upon to identify and present as forecasts the laws of the occurrence of social processes. Thus, the Comprehensive Program of Scientific and Technical Progress is being formulated with respect to a wide range of questions: along with the determination of the prospects in all the most important directions of scientific and technical progress, the program establishes its socioeconomic consequences and the means of eliminating possible negative phenomena.

An exceptionally important role in the formulation of the Comprehensive Program of Scientific and Technical Progress belongs to economists. The program is a multilevel document, which encompasses, as has already been stated, all the aspects of the life of society. And whereas structurally the bulk of the program is sectorial sections, which are being formulated by specialists and scientists of the sectors, the results of economic research are the "core" of each section, as well as of the program as a whole.

The Comprehensive Program of Scientific and Technical Progress is being formulated in conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" (1979). It is regarded as the most important basis of long-range planning, which orients the economy toward the quickest use in production of the achievements of science and fundamentally new technologies and technical solutions. The formulation of such a program was begun for the first time in 1972 in the process of drafting the 10th Five-Year Plan of the Development of the USSR National Economy. It was formulated for the period of 1976-1990. Its draft received a positive rating at the 25th CPSU Congress.

In the Ukrainian SSR the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences was formulated for the first time in 1973 with a forecast to 1990. Its recommendations were used when drafting the 10th Five-Year Plan. In 1980 the Comprehensive Program of Scientific and Technical Progress for the Period 1981-2000 was formulated in the republic. As compared with the first program (to 1990) it is distinguished by a broader and deeper content and a wider horizon of programming. The materials of this program served as the basis for the drafting of the 11th Five-Year Plan.

In 1983 the formulation of the Comprehensive Program of Scientific and Technical Progress in the Ukrainian SSR National Economy to 2005 was completed. It is serving as the basis for the drafting of the plan of the development and distribution of the productive forces of the Ukrainian SSR for 15 years, the 12th Five-Year Plan, and the Basic Directions of Economic and Social Development to 2000. The program specifies the directions of the development of the scientific potential and scientific and technical progress in the sectors of physical production and the nonproduction sphere; measures



on the assurance of the efficient use of manpower and natural resources and environmental protection; it shows the socioeconomic consequences of scientific and technical progress. Particular attention is devoted to the development and introduction of fundamentally new technologies, to the acceleration of scientific and technical progress in machine building, ferrous metallurgy, and the chemical industry, to the development of the fuel, energy, and agroindustrial complexes, and to regional problems of scientific and technical progress. Suggestions on the introduction in the national economy of scientific research, which can be included in the plan of the economic and social development of the Ukrainian SSR for 1986-1990, were also prepared.

The Ukrainian SSR Academy of Sciences, the Ukrainian SSR State Committee for Construction Affairs, the Ukrainian SSR Ministry of Higher and Secondary Specialized Education, and the Southern Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin at present are formulating a new Comprehensive Program of Scientific and Technical Progress with a horizon of programming to 2010. The organization and scientific methods supervision of the formulation of comprehensive programs are carried out by the Interdepartmental Scientific Council for Problems of Scientific, Technical, and Socioeconomic Forecasting attached to the Presidium of the Ukrainian SSR Academy of Sciences and the Ukrainian SSR State Planning Committee. The basic structural subdivisions of the scientific council are its problem commissions, which draft the sections of the comprehensive program for individual sectors of the national economy and socioeconomic problems. At present 35 problem commissions, which coordinate the work of more than 220 coperforming organizations, are working within the council. All the ministries and departments of the republic and the departments of the Ukrainian SSR State Planning Committee are also taking part in the work on the comprehensive program. In other words, practically the entire scientific and technical potential of the republic, as well as the majority of leading specialists of the sectors of the national economy have been enlisted at present in the formulation of the comprehensive program.

The program consists of 35 sections which encompass the questions of:

- the coordination of the basic directions of economic and social development and the tasks of scientific and technical progress, which follow from them;
- the determination of the basic directions of the development of science;
- the determination of the means of accelerating scientific and technical progress in the major sectors of the national economy;
- the increase of the volumes of the use of secondary resources;
- the forecasting of the economic and social consequences of scientific and technical progress;
- the improvement of the system of the management of the national economy and the regulation of social relations in the economic legal respect.

In 1984 the Presidium of the Republic Board of the Economic Science Society recommended to the oblast boards to take part in the work of the problem commissions on the formulation of all the stages of the comprehensive program. A number of oblast boards and the Kiev City Board of the Economic Science Society actively joined in this work.

First of all precisely the comprehensive programs are called upon to ensure an approach to new equipment and technology, which is different from the traditional approach. The orientation toward advanced technical and technological solutions should begin with forecasts and encompass a wide range of scientific, technical, and economic problems. Here it is important to single out in the enormous volume of results of sectorial research the main, decisive units and to show the economic and social consequences of the introduction of the corresponding technical and technological solutions. The consideration in developments for the future of the resource limitations is directly connected with this most important problem. It is well-known that their influence on the economic and social development of the national economy of the republic will increase. Therefore, it is necessary to achieve the orientation of forecasts toward the leading introduction of resource-saving technologies and the all-round intensification of production in all sectors. The determination of the volumes of various resources, which are really accessible for use in the future, is an important component of this work. This applies, first of all, to manpower resources, as well as to the set of problems which are defined as the "ecological capacity." For our republic the ecological factor is already now one of the most important limiting factors of economic growth and the research being conducted within the framework of the preparation of the comprehensive program should give a clear answer to the question of the ecological potentials of the republic.

Another important feature should be noted. The previous comprehensive programs were frequently drawn up by purely planning methods. Therefore, a number of forecasts experienced the influence of specific planning decisions which were being made during the period of the coordination of the sections of the program in the departments of the State Planning Committee. Moreover, it should be noted that the extrapolation approach, which does not make it possible to take into account the structural changes which are caused by new technologies, was used extensively when forecasting the indicators. As was noted at the meeting of the Interdepartmental Scientific Council for Problems of Scientific, Technical, and Socioeconomic Forecasting, the maximum development of variant calculations will contribute in many ways to the overcoming of such a situation, as well as to the improvement of the use of the comprehensive program in practice. The most prevalent system of such calculations of the three versions (the maximum, the minimum, and the base) is capable of meeting completely the needs of management practice for the substantiation of alternate decisions. Here the versions should contain qualitative differences and should characterize the results of the use of the three fundamentally different approaches to the development of the sector and to the solution of social problems. Precisely on the basis of variant calculations the comprehensive program as a component of the system of planning can contribute to the improvement of the latter and give clear information on the alternate possibilities of development.

What has been said applies to practically all the sections of the comprehensive program. At the same time one should distinguish a number of its components, in the preparation of which the participation of economists is especially important. This applies first of all to the problems of the improvement of the economic mechanism. The comprehensive program in itself is a most important component of the improvement of management and planning. At the same time it is also called upon to become a summary of the corresponding measures at the level of the republic, ministries, departments, and intersectorial organs of economic management. Such a task faces all the developers of the program without exception. The principle of the selection of promising directions of the improvement of the economic mechanism is quite obvious: all the outlined measures should ensure the accomplishment of progressive changes in the structure of social production.

The party has posed the task of creating an integral system of the management of the national economy on the basis of the principles inherent in socialism. Therefore, in the comprehensive program it is important to formulate and substantiate the general conception of the development of the system of the planned management of the national economy of the republic. Within the framework of the comprehensive program this work is being carried out in three basic directions: the improvement of management and planning, the improvement of socialist production relations, and legal questions of the improvement of the economic mechanism. The developers of the section are taking into account the directives of the April (1985) CPSU Central Committee Plenum on this question. Thus, the recommendations of the program should correspond to the demand that it is necessary "to make the economy dynamic, balanced, and most receptive to scientific and technical progress and to ensure a vital interest in this of all the units of the national economy and their irreversible responsibility for the introduction of the latest achievements of science and technology and for the achievement of the leading levels in the world." (Footnote 3) (M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii," p 23)

If we speak about what has been done within the framework of the preparation of the comprehensive program, it should be noted that all the developers have launched directly forecasting research. The basic attention at present is focused on the preparation of the preliminary version of the program, which will be completed already this year. The drawing up of "The Basic Directions of the Formulation of the Comprehensive Program" was an important stage of this work. They contain the most important problems of the long-range development of the national economic complex of the republic, as well as the directions of their further study within the framework of the comprehensive program. The means of the intensive development of the national economy of the republic in the future are specified, the questions of the retooling of the sectors of physical production are examined on the basis of the specification of the overall aims of the unified scientific and technical policy.

At present the work on the scientific methods support of the preparation of the comprehensive program is being continued with the active participation of members of the Economic Science Society. A method and tools for the conducting of forecasting research on the basis of surveys of experts have

been developed in the Council for the Study of the Productive Forces of the Ukrainian SSR of the Ukrainian SSR Academy of Sciences. The use of such a method of research will make it possible to make more precise the list of the most promising technologies for various sectors of the national economy and to ensure the more detailed and sound elaboration of these questions during the formulation of the corresponding sections of the program. The methods support of the selection and forecasting evaluation of basic scientific problems has also been prepared. This method will be used when preparing the section "The Development of Science" of the comprehensive program.

The extensive use of the goal program method is one of the most important bases of the raising of the content of planning to a qualitatively new level. The formulation of republicwide scientific and technical programs is a further development of the goal program method of the management of scientific and technical progress. At present the formulation of seven such programs: "Labor," "The Energy Complex," "The Agroindustrial Complex," "Material Intensiveness," "Metal," "Transportation," and "Biotechnology," is being carried out for the 12th Five-Year Plan. In the sectors of the republic and in the oblasts programs, which either are a continuation and specification of the republicwide programs or reflect the specific nature of each sector and region and the features of their scientific, technical, and production potentials, are being developed.

One should dwell especially on the regional aspect of the management of scientific and technical progress, since at this level a broad field of activity is created for local organizations of the Economic Science Society. The social consequences of scientific and technical progress are especially perceptible at the regional level, since they cause the emergence of problems which are solved in the sectors with difficulty and frequently not actively enough. Among such problems are:

- the efficient use of manpower resources;
- the complete use of the natural resources of the region;
- environmental protection;
- the specialization of the output of products for intersectorial use;
- the development of the production and social infrastructures of the region;
- the improvement of the management of the construction and transportation complexes.

Here it must be emphasized that these problems are regional, while the sectors should allocate assets for their solution. It has already been noted above that scientific and technical progress, unfortunately, entails a number of negative socioeconomic consequences, which must be eliminated on the corresponding territories. This explains the fact that in the past 10-15 years a search for regional organs of management and organizational forms of the solution of all these problems was made. Here the essence of this search consisted not in the replacement of sectorial organs of management

and not in the aspiration to pursue a local technical policy, but in the increase of the role of party and soviet organs and the strengthening of the influence of scientific institutions on the drafting and fulfillment of plans of scientific and technical progress.

In each oblast of the Ukrainian SSR councils for the promotion of scientific and technical progress attached to the oblast party committees have been set up and scientific centers of the Ukrainian SSR Academy of Sciences or scientific coordinating councils, which coordinate the scientific studies of regional problems, regardless of the subordination of scientific research and planning and design institutions and higher educational institutions, have been formed. The corresponding subdivisions have been set up under the oblast planning commissions and statistical administrations. The performed work received a positive rating. "In the interests of the complete solution of the problems of the acceleration of scientific and technical progress and the overcoming of the frequently narrow departmental approach to the organization of the use of the achievements of science and advanced know-how the party committees of a number of large scientific and industrial centers of the republic have set up as a voluntary service kinds of regional organs of the management of scientific and technical progress. ...Their activity is being studied closely by the Ukrainian CP Central Committee, while the experience of the work of the Donetsk, Lvov, and a number of other oblast committees and the Kiev City Party Committee received approval and extensive dissemination." (Footnote 4) (V.V. Shcherbitskiy, "Nauchno-tehnicheskii progress--zabota partiynaya" [Scientific and Technical Progress Is a Party Concern], Kiev, Politizdat Ukrainy, 1983, pp 33-34)

Regional scientific and technical programs and socioeconomic programs are the most important components of the system of the territorial management of scientific and technical progress in the oblasts of the republic. In each oblast they are formulated as applied to the specific nature of the region, the state of the scientific potential, and the outlined prospects of development. But precisely the formulation of these programs and the subsequent organization of their fulfillment are a broad field of activity for the activists and organizations of the Economic Science Society.

Let us examine the peculiarities of the regional programs on the basis of the example of Donetsk Oblast. The presence of a developed industrial potential and scientific and technical potential predetermined the necessity of and provided the opportunity for the formulation of the Comprehensive Program of Scientific and Technical Progress in Industry of Donetsk and Voroshilovgrad Oblasts for the Future to 2000, which was the first in the country. The method of formulating the program was prepared by a collective of staff members of the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences, while the program was drawn up with the participation of practically all academic and sectorial scientific research institutes and planning and design organizations of the Donbass and the leading production and scientific production associations.

The formulation of the regional program of scientific and technical progress was a concrete example of the effective coordination of the efforts of scientific organizations for the solution of regional problems. In the

program the technical problems, which require scientific elaboration, were specified on the basis of the forecasts of the directions of the industrial development of the Donbass and the development of the scientific and technical potential. This made it possible to determine the participation in the solution of these problems of the scientific institutions of the Donbass and to identify the problems, in the study of which it is necessary to enlist other institutions in conformity with the contract of the Ukrainian SSR Academy of Sciences with enterprises and organizations of Donetsk and Voroshilovgrad Oblasts, which was concluded in 1979.

In the regional Comprehensive Program of Scientific and Technical Progress the directions of scientific and technical progress for the future were studied in detail for the leading sectors of industry of the Donbass. Along with this specific sections were singled out: the development of automated control systems, the decrease of the use of manual labor, the saving of material resources, the increase of consumer goods production. Particular attention was devoted to the section of the improvement of the use of nature and environmental protection. The Comprehensive Program of Scientific and Technical Progress became the basis of the drafting of the five-year plans of scientific and technical progress in industry of both oblasts.

Along with the formulation of a detailed regional program of scientific and technical progress, the drafting of a regional section in the Comprehensive Program of Scientific and Technical Progress of the Ukrainian SSR is envisaged by the prevailing method. Therefore, the basic directions of the formulation of the regional section of the Comprehensive Program of Scientific and Technical Progress for the Period to 2010--"Scientific and Technical Progress in the Donetsk Region"--have already now been prepared by the Donetsk Scientific Center of the Ukrainian SSR Academy of Sciences jointly with the aktiv of the Economic Science Society. Such sections are being drafted in all the regions of the republic, and the organizations of the Economic Science Society can take a most active part in this work.

The drawing up of the regional section of the Comprehensive Program of Scientific and Technical Progress under present conditions is connected with a number of peculiarities. First, it is necessary to take into account all the suggestions and shortcomings, which were indicated in the decree of the Ukrainian CP Central Committee "On the Organizing Work of the Donetsk Oblast Party Committee on the Fulfillment of the Decisions of the 26th CPSU Congress and Subsequent CPSU Central Committee Plenums and the Decrees of the Party and Government on the Acceleration of Scientific and Technical Progress" (1984). Second, it is necessary to take into consideration the increased negative socioeconomic consequences of scientific and technical progress and, in particular, the worsening of the ecological situation in the Donbass. Suffice it to note that at present more than 25 percent of the annual output of waste products in the Ukrainian SSR is formed in the Donbass, and, according to estimates of the Ukrainian SSR State Planning Committee, the load on the environment exceeds the average load for the country. Third, it is necessary to devote more and more attention to the problems of the decrease of manual labor, the proportion of which for Donetsk Oblast is decreasing at an inadequate pace. Fourth, in connection with the significant concentration of industry in the Donbass and, consequently, the practically complete halt of

the construction of new large industrial enterprises, the problem of the retooling and renovation of industry of the region has been placed in the forefront. One should dwell especially on the last problem. In the report at the April (1985) CPSU Central Committee Plenum M.S. Gorbachev emphasized: "Revolutionary changes are needed--the changeover to fundamentally new technological systems and to equipment of the latest generations, which provide the greatest efficiency. It is a question in essence of the retooling of all the sectors of the national economy on the basis of the present achievement of science and technology." (Footnote 5) ("Materialy Plenuma Tsentralnogo Komiteta KPSS 23 aprelya 1985 goda" [Materials of the CPSU Central Committee Plenum of 23 April 1985], Moscow, Politizdat, 1985, p 10)

The analysis of the statistical data shows that the rate of the retooling and renovation of operating works is inadequate. Thus, in industry of the republic the proportion of capital investments in retooling and renovation in 1980 came to 31.8 percent as compared with 21.6 percent in 1979. But in subsequent years of the five-year plan it stabilized and for 1983 came to 32 percent. (Footnote 6) (See "Narodnoye khozyaystvo Ukrainskoy SSR V 1983 godu. Statisticheskiy yezhegodnik" [The Ukrainian SSR National Economy in 1983. A Statistical Yearbook], Kiev, "Tekhnika", 1984, p 211) It is necessary to note that during the current five-year plan the expenditures on retooling and renovation in a number of ministries of the republic have decreased.

The retooling and renovation of operating works are aimed at the substantial increase of the technical level of associations and enterprises. But this goal is also being achieved slowly because associations and enterprises are not taking out of operation worn-out and obsolete equipment, while this is leading to the unjustified increase of the number of operating workplaces, the decrease of productivity, and the increase of expenditures on repair. The data on the placement into operation of fixed production capital and its retirement for industry of the republic attests to this (in percent). (Footnote 7) (See the statistical collections "Narodnoye khozyaystvo Ukrainskoy SSR" [The Ukrainian SSR National Economy] for 1981 (p 106), 1982 (p 90), and 1983 (p 90))

<u>Years</u>	<u>Placement in operation</u>	<u>Retirement</u>
1981	6.8	1.4
1982	6.5	1.4
1983	6.4	1.4

The cited data attest that to a significant extent the assets for renovation and retooling were used for the purchase of new equipment, which was used for the expansion of production, and not for retooling. The stable writing off of retired fixed capital in the amount of 1.4 percent of the value of the fixed capital in operation attests that already extremely obsolete equipment, which is completely unsuitable for work, was written off. Consequently, we need to strive for the systematic increase of the proportion of capital investments, which are being channeled into the retooling of operating works, and at the same time for the resolute removal from operation of obsolete equipment. At the conference in the CPSU Central Committee on questions of the acceleration

of scientific and technical progress the task was posed already during the 12th Five-Year Plan to increase the share of assets, which are being channeled into renovation, in the total amount of productive capital investments from one-third to one-half.

The implementation of the retooling and renovation of operating enterprises should reduce not simply to the replacement of worn-out and obsolete equipment, but first of all the shift of production to a new level, that is, on a modern technological basis with allowance made for the prospects of development.

In this connection the change of the structure of the equipment being produced is playing an enormous role in the acceleration of the retooling of enterprises. Such a change is being carried out. In 1984 the output of NC machine tools as compared with 1980 increased by 1.8-fold, machine tools like the "machining center"--2.5-fold, transfer lines--by 1.5-fold. The production of robotic complexes and flexible readjustable lines, modules, and systems was begun during the current five-year plan. Experience in the significant shortening of the time from the design development to the output of an item exists at the Ivanovo Machine Tool Building Association imeni 50-letiya SSSR, while experience in the significant shortening of the time of the designing of new equipment exists at the Ulyanovsk State Special Design Bureau of Heavy and Milling Machines. However, it must be emphasized that the volumes of the output of modern equipment are obviously inadequate for the meeting of the needs, while the experience in shortening the time of the designing and assimilation of new items is not being disseminated.

At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress the task was posed to increase during the 12th Five-Year Plan by 1.5- to 2-fold the growth rate of machine building, "in 1986-1990 to increase capital investments for civil machine building ministries by 1.8- to 2-fold as compared with the 11th Five-Year Plan. Such an approach would meet the interests of the retooling of our economy." (Footnote 8) (M.S. Gorbachev, "Korennoy vopros ekonomicheskoy politiki partii," p 14) It should also be recalled that the retooling and renovation of operating production are also aimed at the assurance of the achievement of social efficiency: the decrease of manual, difficult physical, unskilled, and harmful labor; the improvement of working conditions; the meeting of the needs of workers for meaningful, creative labor; the decrease of environmental pollution.

The work on the retooling and renovation of operating works should be combined with the conducting of the certification of workplaces following the experience of the Dnepropetrovsk Combine Plant imeni K.Ye. Voroshilov, which was endorsed by the CPSU Central Committee. The activists of the Economic Science Society can and should take a most active part in the conducting of the certification. The conducting of such a certification will make it possible to establish the number of workplaces in the republic, to coordinate it with demographic forecasts, and to implement measures on the balancing of workplaces with manpower resources. Moreover, the certification of workplaces makes it possible to identify the equipment which under the given conditions



is no longer suitable for operation and has become obsolete, for the determination of the dates of its removal from production.

It should be emphasized that the performance of work on renovation and retooling takes up a long period, approximately 15-20 years. Therefore, for the high-quality performance of this work for such a long period it is necessary to recommend to enterprises and associations, ministries and departments to begin the formulation of such a long-term program, which would ensure the achievement of the posed goals of renovation. The preparation of procedural instructions for enterprises and associations, ministries and departments is necessary for the performance of such work. The Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences and activists of the Economic Science Society prepared for enterprises and associations a method of formulating the long-term scientific and technical goal program "The Retooling and Renovation of Industry of the Donbass" in conformity with the decisions of the bureaus of the Donetsk and Voroshilovgrad Oblast Committees of the Communist Party of the Ukraine. This year the enterprises and associations of the two oblasts are performing work on the drawing up of a program, which is intended for the period to 2000, with the participation of activists of the Economic Science Society under the supervision of the Donetsk Scientific Center of the Ukrainian SSR Academy of Sciences and with the participation of the scientific research institutions of the region.

Staff members of economic scientific research institutions and chairs of higher educational institutions are taking part in the work of the Economic Science Society. They can conduct studies of the economic and social problems of the retooling and renovation of production. Among these problems one should name the determination of the content of retooling and renovation in their interconnection and the elaboration of a scientifically sound concept of the proportion of retooling and renovation in the total amount of capital investments with allowance made for its dynamics and sectorial peculiarities. Special studies in the area of the efficiency of the retooling and renovation of production and the close connection of the section of scientific and technical progress with the plan of economic and social development, the financing of operations, and the social results and consequences of the retooling and renovation of production are necessary.

Attention should be directed to another direction of the work, in which the activists of the Economic Science Society can participate. This is the elaboration of measures which ensure the increase of the use of secondary raw materials, waste products, and byproducts. The Ukrainian SSR State Planning Committee, the Ukrainian SSR State Committee for Material and Technical Supply, and the local planning and supply organs have performed much work on the assurance of the monitoring of the progress of the fulfillment of the assignments on the more complete use of secondary resources. Suffice it to say that in 1984 the value of the primary raw materials, which were replaced by secondary raw materials, came to nearly 1.6 billion rubles. And this is without allowance made for the scrap metal which is being procured by the State Trust for the Procurement and Processing of Secondary Ferrous Metals. The absolute amounts of the replacement of a number of types of raw materials came to an impressive amount. In particular, 6.5 million tons of sinter burden will be saved owing to iron-containing waste products; more than

5 million cubic meters of lumber will be saved owing to scrap wood and waste paper; more than 12 million tons of cement raw materials will be saved owing to granulated slag and other additives. The production of crushed rock from metallurgical slags and overburden rocks is making it possible to save annually more than 30 million tons of natural raw materials. The use of the waste products of coal dressing in the production of construction materials and the heat reclamation of various waste products are ensuring the replacement of 700,000 tons of standard fuel.

The use of secondary raw materials has several economic consequences. First, the cost of them (which were used for the replacement of primary raw materials in 1984) is 700 million rubles, that is, 900 million rubles less the cost of primary raw materials. Second, the capital investments, which are necessary for the obtaining of secondary raw materials from waste products, as a rule, are one-half to two-thirds as great as the specific capital investments in the recovery of natural raw materials. The annual saving with respect to this item is estimated at 20-30 million rubles. Third, the increase of the volumes of the extraction of secondary resources by 15 million rubles (per year) decreases the expenditures on the removal of waste products, their storage, and the creation of storehouses. And, finally, it is difficult to estimate by value indicators the nature conservation impact from the use of the waste products of production and consumption. It must not be forgotten that an enormous amount of residual products--1.5 billion tons, the very existence of which upsets the ecological balance, is formed annually.

Approximately one-fifth of all the waste products are formed in Donetsk Oblast. Therefore, both scientific institutions and the aktiv of the society still have to do much work on the solution of the problem of the use of secondary resources. Some work experience has been gained in Donetsk, Voroshilovgrad, and several other oblasts, where catalogues of the waste products of industrial enterprises have been developed. At the same time when formulating the Comprehensive Program of Scientific and Technical Progress one should take into account the need for the improvement of the very system of the management of this economically and ecologically important section.

In 1984 the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences prepared a draft of the procedural instructions for the drafting of the Master Plan of the Management of the Complete Use of Waste Products and Secondary Resources in the National Economy of Donetsk Oblast for 1986-1990 and for the Future to 2005. The coordination of the Master Plan with comprehensive scientific and technical goal programs, the Basic Directions, and other planning documents is envisaged in the draft. The procedural instructions were recommended to the oblast boards of the Economic Science Society for discussion in the section "The Economics of the Use of Nature" of the Republic Board of the Economic Science Society and received the approval of both the section and the presidium of the Republic Board of the Economic Science Society. In accordance with these procedural instructions the Master Plan, which will be submitted by the end of the year for consideration and coordination with the plan of the economic and social development of the oblast for the 12th Five-Year Plan, is being drafted in Donetsk Oblast.

In conclusion it is necessary to note that the implementation of regional scientific and technical programs is not possible without the extensive introduction of advanced know-how. "The sharing of know-how is a mighty catalyst of our progress." (Footnote 9) (M.S. Gorbachev, "Nastoychivo dvigatsya vpered" [Advance Persistently], Moscow, Politizdat, 1985, p 8) The All-Union Central Council of Trade Unions and the Ukrainian SSR Council of Trade Unions approved of the Donetsk Comprehensive System of the Management of the Introduction of Advanced Know-How, (Footnote 10) (The Presidium of the All-Union Central Council of Trade Unions awarded the third prize of Soviet trade unions of 1985 for the work "The Donetsk Comprehensive System of the Management of the Introduction of Advanced Know-How" (see TRUD, 19 July 1985)) which was developed by a number of scientific organizations under the supervision of party and trade union organs and under the scientific supervision of the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences and was introduced in a number of oblasts of the republic. This system envisages an extensive scale of the participation of scientific and technical societies, including the Economic Science Society, in the introduction of advanced know-how. However, not all oblast boards know this know-how well enough and are introducing it in the practice of their work. The oblast boards of the Economic Science Society by the selection of the most promising results with respect to the most important economic and organizational problems of the formulation of long-term scientific and technical programs and plans of scientific and technical progress during competitions, reviews, and scientific business trips could contribute to the increase of the level of the scientific soundness of the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences for the Ukrainian SSR for 1991-2010, which is now being formulated.

The April (1985) CPSU Central Committee Plenum posed a long-range task--the cardinal acceleration of scientific and technical progress. The duty of the activists of the Economic Science Society and all economists is to direct scientific research, the introduction of its results, and practical activity at the accomplishment of this large-scale task.

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## ORGANIZATION, PLANNING AND COORDINATION

### FORMS OF DEVELOPMENT OF PILOT EXPERIMENTAL WORKS

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[Article by doctor of economic sciences Professor I. Cherevko and candidate of economic sciences Ye. Ponomarenko (Lvov): "The Improvement of the Forms of the Development of the Pilot Experimental Works"]

[Text] It is outlined by the decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures on the Acceleration of Scientific and Technical Progress in the National Economy" (August 1983) to implement a set of measures which are aimed at speeding up the creation and equipment of pilot and experimental bases and works. The successful introduction in industrial production of scientific and technical innovations to a significant degree depends on the existence and level of development of the pilot experimental works (OEP)--a specific, special unit of the "research--production" cycle.

The importance of the pilot experimental works is determined by its role in the development and assimilation of new equipment, in the development of science, and in the strengthening of its contact with production. The pilot experimental works creates the necessary conditions for the conversion and physical embodiment of scientific and technical achievements and technological innovations and is a connecting link of the stages of the "science--production" cycle and one of the most important factors of the formation of the economic impact from the introduction of the achievements of science and technology in production.

In case of the introduction in production of unfinished models of items of new equipment the operating costs increase, the need for an additional number of personnel for the repair, adjustment, and maintenance of items arises, and product quality decreases. Moreover, the bringing of the models of items of new equipment up to the requirements of the technical assignment under the conditions of industrial production worsens its industrial financial indicators. The important role of the pilot experimental works in the development and assimilation of new equipment determines the objectively necessary diversity of the goals and tasks of the pilot experimental works at the stages of the "science--production" cycle.

The increase of the needs of society for the successful implementation and use of highly efficient scientific and technical achievements in the form of new

models of items and technologies is bringing about the need for the rapid development of the pilot experimental works. Meanwhile, in spite of definite changes in the rate of development of the pilot experimental works as a whole, the level of its development is still inadequate and does not satisfy the requirements with respect to the assurance of the necessary rate of the updating of products in industrial production. In the mentioned decree of the CPSU Central Committee and the USSR Council of Ministers it was also indicated that the pilot production and experimental base lags behind present requirements.

The system of the planning of the pilot experimental works, especially its cost accounting, needs further improvement. As the results of the survey conducted by us of a number of pilot experimental works of Lvov showed, at individual pilot experimental works cost accounting is still being used insufficiently completely and comprehensively. The proper choice of the set of indicators of the planning of the evaluation of activity is the central unit of the mechanism of the cost accounting management of the pilot experimental works. In accordance with the results of the conducted studies we prepared and introduced at a number of enterprises and associations procedural recommendations on the improvement of the cost accounting of the pilot experimental works. (Footnote 1) ("Metodicheskiye rekomendatsii po vyboru khozraschetnykh pokazateley planirovaniya i otsenki deyatel'nosti opytno-eksperimental'nogo proizvodstva v sostave razrabatyvayushchego predpriyatiya" [Procedural Recommendations on the Choice of the Cost Accounting Indicators of the Planning and Evaluation of the Activity of the Pilot Experimental Works Within a Developing Enterprise], Lvov, 1982) The basic goal of the development of the procedural recommendations is to give the workers of the economic services of enterprises and associations, who are responsible for the introduction and improvement of internal production cost accounting, an effective procedure of the choice and substantiation of the cost accounting indicators of the planning and evaluation of the activity of the pilot experimental works and to ensure thereby the creation of the necessary base for the improvement of the cost accounting of the pilot experimental works.

The provisions, which are set forth in these procedural recommendations, are standard and can be used as a methodological base when choosing the set of cost accounting indicators of the planning and the evaluation of the activity of the pilot experimental works. The procedural recommendations envisage the possibility of choosing the set of indicators of the planning and evaluation of activity with allowance made for the peculiarities of the specific pilot experimental works.

The results of the study made by us of a number of pilot experimental works of instrument making of Lvov made it possible to identify several peculiarities and indicated the still inadequate level of the development and study of their manpower resources and production capacities both as a whole and by the factors which determine them. It is necessary to eliminate the differences in the development of pilot experimental works by factors, which determine the production capacity of individual pilot experimental works (the level of the capital-worker ratio, the coefficient of the technical novelty of the pool of equipment, and others), by the redistribution of equipment, the labor

intensiveness of operations, and the decrease to 50 percent and less the proportion of industrial products in the program of the work of pilot experimental works. It is advisable by the systematic increase of the production areas of pilot experimental works to increase the indicator of the specific area, for which 1 worker of the pilot experimental works accounts, to at least 12 square meters. The remuneration of the labor of the workers of the pilot experimental works should also be increased at least to the level of workers of industrial production, the level of the specialization of the labor of workers of the pilot experimental works should be increased, by means of which the losses of working time on the performance of noncharacteristic operations should be decreased, increasing the coefficient of the division of labor to 0.97-1, and the coefficient of the service of workplaces to 0.97-0.99. It is necessary to improve the supply of the pilot experimental works with raw materials, materials, tools, accessories, and work furniture.

The conducted studies indicated the need for the changeover in case of the management of the development of production capacities and manpower resources from the prevailing methods of planning "from the achieved level" to methods which are oriented toward the standard level. On this basis we proposed a method of determining the generalizing indicators of the level of the development of production capacities and manpower resources of pilot experimental works, (Footnote 2) ("Sovershenstvovaniye organizatsii i intensifikatsii proizvodstva na promyshlennykh predpriyatiyakh (obyedineniyakh)" [The Improvement of the Organization and Intensification of Production at Industrial Enterprises (Associations)], Kiev, 1982, deposited at the Ukrainian Scientific Research Institute of Scientific and Technical Information on 1 November 1982, No 3908, Uk-D-82, pp 41-52) which is based on the introduction of the concept "the hypothetical mean pilot experimental works," a new set of indicators which determine them, expert methods of the calculation of the importance of special indicators, and a specially developed computer program of the calculation of data.

The methods of determining the necessary amounts of capital investments in development of the pilot experimental works need improvement and further development. The existing recommendations on the amount of resources for the development of the pilot experimental works vary over a wide range from 1 percent (according to the data of the State Committee for Science and Technology) to 10 percent (according to the data of V. Sominskiy) of the assets, which are intended for capital investment in the corresponding sectors, and, as a rule, are based on economic estimates, that is, are of a forecasting nature. There also exist other recommended values within the indicated sections. Thus, M. Bashin, G. Glagoleva, and V. Kushlin propose to allocate for the development of the pilot experimental works respectively 4-4.5 percent, 5-6 percent, and 2-3 percent of the capital investments being allocated for the development of sectors.

The correlation dependence obtained by us between the proportion of pilot operations in the cost of experimental design development (x) and the time of the introduction of the development (y) (Footnote 3) ("Upravleniye i modelirovaniye razvitiya territorialno-proizvodstvennykh kompleksov i obyedineniy" [The Management and Modeling of the Development of Territorial Production Complexes and Associations], Kiev, IE AN USSR, 1982, p 30) of the

type:  $y = 6.29 - 22.1x + 21.51x^2$ , as well as the correlation dependences obtained by other authors between the ratio of the number of workers of the pilot experimental works to the number of workers of the scientific research institute without a pilot experimental works ( $x_1$ ) and the proportion of works, which were introduced in years K and (K+1), from the number of works, which were performed in year K ( $y$ ), (Footnote 4) (V.N. Kushlin, "Uskoreniye vnedreniya nauchnykh dostizheniy v proizvodstvo" [The Acceleration of the Introduction of Scientific Achievements in Production], Moscow, "Ekonomika", 1976, pp 85-87) which is described by the equation

$$y_1 = 0.274 + 0.57x_1,$$

of the given volume of output being updated ( $x_2$ ) and the expenditures on the pilot experimental works ( $y_2$ ), (Footnote 5) (E.M. Torf, "The Increase of the Economic Efficiency of Pilot Works," VOPROSY EKONOMIKI, No 11, 1980, p 72)

$$y_2 = 14.6 + 0.03x_2,$$

attests to the inadequate amounts of resources, which are being allocated for the development of the pilot experimental works.

The analysis of the first dependence attests that it is possible to regard as economically justified not any expansion of the pilot experimental works. Maximum levels of the development of the pilot experimental works, which are determined by the specific conditions of production, the sectorial peculiarities, the scientific and technical potential of society, and other factors, exist. It is necessary to take this into account when forecasting and planning the development of the pilot experimental works.

An important reserve of the intensification of the development of the pilot experimental works is the use and improvement of the regional forms and methods of the management of its development. Here the basic efforts, in our opinion, should be aimed at:

--the development of cooperation and the coordination of the activity of the pilot experimental works and the developing enterprises of the region on the development of new equipment;

--the specialization, cooperation, and concentration of the pilot experimental works of the region with allowance made for the tasks of the development of scientific research and development in the region;

--the generalization of the advanced foreign and domestic know-how in the area of the development of the pilot experimental works and the elaboration of measures on its use;

--the organization of the efficient spatial development and the distribution of the pilot experimental works in the region;

--the drafting of plans and forecasts of the development of the pilot experimental works in the region;

--work on the unification, standardization, and normalization of the prototypes of systems, items, blocks, and parts;

--work on the determination of the legal and economic status of the pilot experimental works in the structure of the regional forms of the conducting of research and development (RFPIR);

--the management of material and technical supply and the exchange of instruments and equipment of the pilot experimental works of the region.

The work in these directions should be coordinated with and submitted for approval to the ministries and departments which have their own pilot experimental works. The implementation of these measures in practice would increase the efficiency of the development and use of the production potentials of the pilot experimental works of the region. When planning the distribution of the pilot experimental works in the region one should strive to create in this case the optimum conditions for the conducting of scientific and technical activity.

As a promising organizational form of the development of the pilot experimental works in the Ukrainian SSR it is possible to propose the development of pilot experimental works by the proportionate involvement of the assets of a number of related sectors, the enterprises of which are located in the given region. The scientific supervision of such pilot experimental works should be assigned to the regional scientific centers of the Ukrainian SSR Academy of Sciences. The existence of clear statutes (instructions, handbooks), which regulate their economic and legal status, as well as the procedure of interrelations and the sphere of competence in the cooperation of the Ukrainian SSR Academy of Sciences and the ministries, which have established and are financing such pilot experimental works, is necessary for the efficient functioning of such formations.

At pilot experimental works of the instrument making type, which have the tendency for the frequent change of the objects of production, the use of the optimum number of standard, normalized, and unified means of labor, technological processes, technical specifications, parts, blocks, assemblies, and methods of tests is becoming especially efficient, since it is making it possible to decrease significantly their exceptional diversity. Therefore, for the purpose of decreasing the time, labor intensiveness, and cost of pilot operations it is necessary when designing new items to incorporate in their design the maximum possible number of unified, normalized, and standard blanks, parts, blocks, and assemblies, which have already been produced in industrial production of the developing enterprise, to which the given pilot experimental works belongs, or by another industrial enterprise. For the assurance of their deliveries within the service of material and technical supply of the pilot experimental works it is necessary to establish a subdivision of direct relations and deliveries under subcontracting arrangements.

When producing models of new equipment at the pilot experimental works of the region of the instrument making type it is advisable to use the experience of the Lvov Production Association imeni V.I. Lenin, where the work on



normalization, unification, and standardization is carried out by the technical services at all the stages of the development and production of models of new equipment, as well as in case of industrial production. The development of items of new equipment is being carried out so that the degree of unification would be not less than 75-85 percent. In individual instruments the level of unification comes to 90 percent. In case of the development of fundamentally new items the level of unification is substantially lower--20-50 percent.

For the purpose of increasing the efficiency of the use of the production potential of the pilot experimental works of the region one should determine the group of pilot experimental works, which are responsible for and are specialized in the region in the production of individual types of blanks (including castings made of ferrous metals, pig iron, steel), parts, assemblies, blocks, forge pieces, tools, accessories, printed circuit boards, and other means needed in the production process, the economical and highly efficient production of which requires expensive, high-performance equipment and highly skilled service personnel. It is obvious that it is economically unjustified to perform such operations at each pilot experimental works, and if they are not carried out or it is economically unprofitable to fulfill them in industrial production of the enterprises of the region, the cooperation of the pilot experimental works of the region is the only possible means of their efficient performance. Thus, in the plans of the development of the pilot experimental works of the region it is necessary to envisage for the current and future periods the broadening of the scale of cooperation and specialization. The implementation of these measures will make it possible to ensure the increase of labor productivity and the increase of the efficiency of the pilot experimental works.

When performing work on the determination of the legal and economic status of pilot experimental works and the structure of the regional forms of the conducting of research and development it is necessary to settle and to implement as a statute (instructions, procedural instructions) on the pilot experimental works the following questions:

--the basic goals and tasks of the activity of the pilot experimental works within the regional forms of the conducting of research and development;

--the functions of the pilot experimental works in the regional forms of the conducting of research and development;

--the structure of the enterprises, which are responsible for the performance of pilot operations in the region, the regional forms of the conducting of research and development;

--the rights and duties of the pilot experimental works in the structure of the regional forms of the conducting of research and development;

--the procedure of the drawing up and passage of orders for the performance of pilot operations;

--the procedure of the compilation and approval of the plans of the performance of pilot operations;

--the interrelations of the pilot experimental works with the developing enterprises of the region (the procedure of submitting counterclaims, the demands on the quality of the products of the pilot experimental works, the time and quality of the technical specifications, which are being submitted by the developing enterprises, and others).

In the management of the organizational and technical development of pilot experimental works, the planning and forecasting of the development of pilot experimental works in the region it is advisable to create an information base for the determination of the level of development of the pilot experimental works of the region, to determine (measure) and analyze the degree of conformity of the achieved level of development of the pilot experimental works of the region to the present requirements on the basis of a comparative analysis of the dynamics of their development over a number of years (5-10) and a comparison with the standard values, to identify the reserves of the increase of the organizational and technical level of the pilot experimental works, and to outline and plan the sequence of the development, renovation, and retooling of the pilot experimental works of the region.

For the purpose of creating the procedural principles of the conducting of further research in this direction the authors formulated procedural recommendations on the measurement of the level of development of the production potential and the comparative analysis of the level of development of the production potential of the pilot experimental works of a region. The study of a number of pilot experimental works of the Western Region of the Ukrainian SSR, which was conducted by means of them, made it possible to establish the present level of their development, to reveal the reserves of the further increase of the efficiency of their production potential, and to outline the advisable directions of their further development, that is, the test results showed the fundamental possibility and advisability of the conducting of additional research in this direction.

The instances, when due to the insufficient delivery of the necessary resources for the performance of work at pilot experimental works the duration of the entire "research--production" cycle increases, are frequent at enterprises. The changeover of material and technical supply to the basis of automated control systems could be a solution of the problem of improving the management of the material and technical supply of pilot experimental works, with the retention of the prevailing system of its organization. At present, in connection with the probabilistic nature of developments, the majority of enterprises, which are participants in the "research--production" cycle, at the moment of the drawing up of orders for materials, components, and semifinished products cannot know completely the real needs of their subdivisions. Therefore, when obtaining funds quite often a shortage of individual materials and, on the contrary, a surplus of other materials appear at pilot experimental works. On the condition of the creation of a data bank within the region or sector (subsector) on the basis of the use of computers and software on the availability, needs, and surplus of materials, components, and semifinished products at each enterprise, which is common to all the

enterprises belonging to it, the opportunity will appear to increase substantially the level of the management of the material and technical supply of pilot experimental works with the retention of the former system of its organization by the efficient redistribution of resources, to decrease significantly the amount of above-standard stocks, and thereby to increase the efficiency of the activity of the pilot experimental works.

In the region or sector (subsector) it is possible to organize the efficient exchange of single-design equipment or equipment, which is not being used at some pilot experimental works, but is needed by other pilot experimental works, instruments, accessories, units, and other devices, having created within the automated control system of material and technical supply of the region or sector (subsector) an information bank on the availability, use, and need for these devices at each enterprise and by carrying out their redistribution by means of it.

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FACILITIES AND MANPOWER

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ANNUAL REPORT SESSION OF LITHUANIAN ACADEMY GENERAL ASSEMBLY

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B in Russian No 5, Sep-Oct 85 pp 133-144

[Article by V. Petrauskas, N. Kharitonova, and S. Skyabene: "The Annual Report Session of the General Assembly of the Lithuanian SSR Academy of Sciences (27 February 1985)"]

[Text] The session discussed the report on the scientific and scientific organizational activity of the Lithuanian SSR Academy of Sciences during 1984, the plan of scientific research work of the Academy of Sciences for 1985, and organizational questions.

President of the Academy of Sciences Academician Yu. Pozhela opened with session with the opening speech. (Footnote 1) (See "Strengthen the Contacts of Science and Practice," SOVETSKAYA LITVA, No 51(12664), 28 February 1985, p 1)

On the suggestion of the president the session participants honored by standing for a minute in silence the memory of Academician Zigmas Yanushkyavichyus, (Footnote 2) (See "Zigmas Januskevicius (1911-1984)," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 1(89), 1985, pp 105-109) who died on 26 May 1984, and Corresponding Member of the Academy of Sciences Yonas Bulavas, (Footnote 3) (See "Jonas Bulavas (1903-1984)," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 2(90), 1985, pp 135-137) who died on 7 October 1984.

In his speech the president of the Academy of Sciences analyzed the most important achievements and problems in the activity of the Academy during 1984 and the tasks for 1985.

Today, as never before, the successful solution of the problems of the development of the economy of the country and Soviet society is connected with the achievements of the basic sciences. This is placing great responsibility on us and requires us to further improve our work.

I would like to stress that our Academy took strong positions in the basic sciences not at once, but owing to many years of painstaking work, by uniting scientific collectives, systematically training highly skilled personnel, and

strengthening the base of scientific research. This work would not have been done without constant assistance and attention on the part of the Lithuanian CP Central Committee and the republic government, the USSR Academy of Sciences, and scientists of the country. This attention and assistance are also not diminishing now.

For nearly 40 years Academician Yuozas Matulis, who directed it, played a large role in the formation of the Lithuanian SSR Academy of Sciences. The specialization of the institutes of the Academy of Sciences and the orientation of their collectives toward the solution of the most important, urgent problems are an especially significant result of his skillful supervision. Our Academy was the first in the country to begin this work. Today we can safely say that precisely the institutes, which eliminated work on many themes, have taken leading positions in Soviet science and can be proud of the high-quality scientific works and the successful use of their results in practice. This is a very important result of the activity of the Academy, which is inseparably connected with the name of Academician Yu. Matulis.

All the most important scientific works, which are listed in the report, are works of a high theoretical level, which were carried out by highly skilled scientists by means of the latest theoretical methods. It is characteristic that wherever the works are being carried out at a high theoretical level, their practical application is also the best.

The institutes of the Physical, Technical, and Mathematical Sciences Department developed work on the introduction of the achievements of science and the cooperation of scientists of various departments.

In the past 3 years various forms of the integration of science and production have been tested. The activity of the Elektronika Scientific Production Complex, which was founded in 1981, was successful. (Footnote 4) (See A. Ramanauskas and Y. Samaytis, "'Elektronika' Is the First Scientific Production Complex in the Lithuanian SSR," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 4(131), 1982, pp 129-132) This complex unites two institutes of the Academy of Sciences, two higher educational institutions, seven departmental scientific research institutes, and six plants. Its goal is not only to introduce in production the results of "its own" work, but also, by cooperating the forces of scientists and the experimental bases of various fields of science and technology, to solve the general problems of the increase of production efficiency, labor productivity, and product quality. Last year the Presidium of the Academy of Sciences decided to use the experience of the Elektronika Scientific Production Complex and to organize another two such associations: these are the Lazery Complex (Decree No 161 of 21 May 1984) and the Galvanotekhnika Complex (11 June 1984). Unfortunately, their organization is still being held up in the bureaucratic machine.

The comprehensive scientific and technical cooperation between the Academy and the city of Shyaulyay received a good evaluation and is yielding its fruits. (Footnote 5) (See Y. Samaytis, V. Ulyavichyus, and V. Petrauskas, "The Prospects of the Comprehensive Scientific and Technical Cooperation Between the Academy of Sciences and the City of Shyaulyay," TRUDY AKADEMII NAUK

LITOVSKOY SSR, SERIYA B, Vol 2(141), 1984, pp 106-112). It should be noted that institutes of the social and natural sciences are also actively participating in it. Unfortunately, work on minor themes is still appearing here. I believe that it is already time to take upon ourselves such a problem as "The Ecology of the City of Shyaulyay" and during the 12th Five-Year Plan, by cooperating all forces, to see to it that industry of the city of Shyaulyay would operate without waste products and would not pollute nature.

It should be noted that all these operations are being organized as a voluntary service. We are still using too little the professional forms of the organization of this work--temporary scientific production collectives. In 1985 it is necessary to use more boldly this form of the integration of science and production, as is already been successfully done by the Institute of Chemistry and Chemical Technology, which has gained valuable experience, by introducing extensively the technologies of electroplating processes, which were developed by it. (Footnote 6) (See A. Ramanauskas and V. Petrauskas, "The Experience of the Institute of Chemistry and Chemical Technology in the Introduction in Production of the Results of Scientific Research," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 2(141), 1984, pp 93-100) In 1984 more than 800 machine building enterprises of the country used the technologies which were developed by the Institute of Chemistry and Chemical Technology, and this provided an annual saving of more than 17 million rubles.

The experience of the Institute of Chemistry and Chemical Technology was discussed at the All-Union Seminar-Conference on Questions of the Increase of the Efficiency of the Introduction of the Results of Scientific Research (On the Basis of the Example of the Institute of Chemistry and Chemical Technology of the Lithuanian SSR Academy of Sciences), (Footnote 7) (See N. Kharitonova, Y. Samaytis, and V. Petrauskas, "Increase the Efficiency of the Introduction of the Results of Scientific Research of Academic Institutes," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 1(146), 1985, pp 140-147) which was held on 5-7 March 1984 in Vilnius and was convened by the Council for the Coordination of the Scientific Activity of the Academies of Sciences of the Union Republics attached to the Presidium of the USSR Academy of Sciences, the Presidium of the Lithuanian SSR Academy of Sciences, and the Central Committee of the Education, Higher Schools, and Scientific Institutions Workers Union. The conference endorsed the activity of the Institute of Chemistry and Chemical Technology and recommended its experience for extensive dissemination in the country. (Footnote 8) (The reports of Yu. Matulis and R. Vishomirskis at the seminar are paraphrased, the course of the seminar and the discussions are described, and the decree of the seminar is paraphrased in the organ of the Presidium of the USSR Academy of Sciences in No 9, 1984, of the journal VESTNIK AKADEMII NAUK SSSR (pp 29-47) in the publication "The Increase of the Efficiency of the Use of the Results of Scientific Research. A Seminar-Conference in Vilnius")

In January of this year the Collegium of the USSR State Committee for Science and Technology discussed the experience of our Academy in the introduction of the results of scientific research. (Footnote 9) (See footnote 1) The activity of the Elektronika Scientific Production Complex, the form of comprehensive scientific and technical cooperation with the city of Shyaulyay, as well as the practical experience of the introduction of the results of

scientific research of the Institute of Chemistry and Chemical Technology received a positive rating.

The establishment at experimental institutes of production bases and plants governed to a large extent the success of the cooperation of the Academy of Sciences with production organizations. The USSR State Committee for Science and Technology also endorsed this practice of ours. These plants are contributing to the fundamental increase of the effectiveness of the cooperation between institutes of the Academy of Sciences and production organizations. Their role in the solution of the problems of scientific and technical progress in the national economy and in the development and production of products, which require a large amount of scientific data, with the use of microprocessors and computers, will also increase in the future.

The long-range state program of the creation, the development of the production, and the efficient use of computer technology and automated systems will hold an exclusive place in the plans of the introduction of the results of scientific research and the increase of the efficiency of scientific work for 1985 and the subsequent period. The collectives of all the institutes of the Academy of Sciences should be trained for the extensive use of microprocessors and microcomputers.

As at the institutes of the exact sciences, at the institutes of the biological type the best results were obtained where the work is performed at a high theoretical level. The institutes of the department are working actively on the problems of the Food Program. A significant portion of the methods, reagents, and instruments, which have been developed at the Academy of Sciences, are being used practically in agriculture and practical medicine. In 1984 the series production of the antileucosis compounds pafentsil and hexaphosphamide, which were developed at the Institute of Biochemistry, was begun. With the assistance of the Elektronika Scientific Production Complex steps are also being taken on the start of the series production of the proximate analyzer of glucose, which was developed at the institute.

However, the contacts of this department with agricultural organizations and sectorial institutes should be strengthened significantly. It is necessary to formulate a specific program of collaboration and the cooperation of forces, which encompasses all institutes of the agricultural and biological type of the republic and would make it possible to solve in combination and effectively the problems of agriculture and nature conservation in the republic.

The management organs of the country and the USSR Academy of Sciences gave a good rating to the work of the Institute of Economics in 1983-1984 on the formulation of the comprehensive program of scientific and technical progress for 1986-2005. However, the theoretical basic study of problems of economics should be the basic section of the work of the academy's Institute of Economics. The economy of our country has achieved a level, when qualitative changes in it are necessary for the assurance of further development. Economists should be in the front ranks of the scientists, who are contributing to the rejection of stereotypic economic thinking and are helping to understand correctly and to study scientifically the objective laws of the

socialist economy and to reveal the means and prospects of the development of the socialist economy. The party requires of economic science the radical improvement of work and requires it to be in front of the qualitative changes now occurring in the socialist economy.

The Institute of Philosophy, Sociology, and Law in 1984 prepared several significant works. Now there are nine doctors of sciences at the institute, therefore, the institute is capable of accomplishing profound theoretical and practically important work. It should be noted that the solution of the social problems of the development of society requires a thorough and solid theoretical basis.

Attention should be directed to the too slow pace of the preparation of the publication of "The Dictionary of the Lithuanian Language." I believe that the forces of the philologists of the Academy and University should be cooperated and the preparation and publication of "The Dictionary of the Lithuanian Language" and other fundamental publications should be expedited.

Further the session heard the report "The Scientific and Scientific Organizational Activity of the Lithuanian SSR Academy of Sciences in 1984," (Footnote 10) (See more extensively on the results of the activity of the Academy of Sciences in 1984: Y. Samaytis, N. Kharitonova, Ya. Ignatyeva, and V. Petrauskas, "The Activity of the Lithuanian SSR Academy of Sciences in 1984," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 5(150), 1985, pp 101-121) which Chief Scientific Secretary of the Presidium of the Academy of Sciences Academician K. Meshkauskas delivered.

The speaker recalled that at the extraordinary session of the General Assembly of the Academy of Sciences, which was held on 26 June 1984, Academician Yuras Pozhela was elected president of the Academy of Sciences, Academician Vitautas Kontrimavichyus was elected academician secretary of the Chemical, Technological, and Biological Sciences Department, and Corresponding Member Yonas Matsyavichyus was elected academician secretary of the Social Sciences Department. (Footnote 11) (See T. Sidorenko, Y. Samaytis, and V. Petrauskas, "The Extraordinary Session of the General Assembly of the Lithuanian SSR Academy of Sciences (26 June 1984)," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 1(146), 1985, pp 125-134)

In 1984 the institutes of the Academy of Sciences studied 637 themes (200 in the area of the natural and social sciences, 437 in the area of the scientific and technical sciences, of them 289 in accordance with economic contracts) and completed the study of 290 themes (81 in the area of the natural and social sciences, 209 in the area of the scientific and technical sciences, of them 177 in accordance with economic contracts).

The institutes of the Academy of Sciences formulated 40 comprehensive programs, among which are 23 all-union, 10 republic, and 7 interdepartmental programs. The Academy of Sciences supervised the accomplishment of 11 republic programs.

The speaker acquainted the people with the basic results of the scientific research work of the institutions of the Academy of Sciences and the higher



educational institutions of the republic in 1984 in individual fields of sciences.

At the end of 1984 the institutes of the Academy of Sciences had and were fulfilling 368 5-year or long-term contracts on creative scientific and technical cooperation.

The Elektronika Scientific Production Complex, which was established in 1981, works efficiently (the supervising scientific organization in the Institute of Semiconductor Physics).

Work is being successfully performed in accordance with the program of creative scientific and technical cooperation and socialist competition with the Belorussian SSR Academy of Sciences for 1981-1985.

All the measures (46 themes, 37 jobs were completed), which were envisaged by the contract on comprehensive scientific and technical cooperation between the Academy of Sciences (11 institutes) and the city of Shyaulay (22 organizations), were completed. In 4 years of cooperation 112 jobs, the results of the majority of which were introduced in production and yielded an economic impact of 1.6 million rubles, were completed.

More attention was devoted in 1984 to the increase of the efficiency of the introduction in practice of the results of research of the institutes of the Academy of Sciences. The total (accumulated over 5 years) economic impact came to 41.8 million rubles.

Economic contracts, the revenues for which came to 10.8 million rubles, while the expenditures on their fulfillment came to 8.89 million rubles, in 1984 were also one of the basic forms of the contacts of the Academy of Sciences with production. The largest share of the work on economic contracts is being performed at experimental institutes.

In 1984, 150 applications for inventions were submitted to the USSR State Committee for Inventions and Discoveries, 109 certificates of authorship and 79 positive decisions were received. More than 150 inventions were shown at various exhibitions in the country and abroad.

In 1984, 164 publications (1,774 publisher's signatures) were published, of them there were 53 issues of periodicals (566 signatures) and 58 books (822 signatures).

The year 1984 was the 30th year of the publication of Series A and B and the 25th year of the publication of Series V of the organ of the Presidium of the Lithuanian SSR Academy of Sciences--the journal TRUDY AKADEMII NAUK LITOVSKOY SSR. During this period 322 volumes with a total size of 5,343 printer's sheets were issued, 5,194 scientific articles were published. (Footnote 12) (See V. Petrauskas, S. Skyabene, and O. Balkyavichene, "The 30th Anniversary of the Journal TRUDY AKADEMII NAUK LITOVSKOY SSR," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 1(146), 1985, pp 150-152)

The institutes of the Academy of Sciences in 1984 organized 11 scientific conferences, meetings, seminars, and symposiums, of them 8 were all-union conferences.

In 1984 the Academy of Sciences organized 90 scientific field trips.

In 1984, 99 associates of the Academy of Sciences went on scientific business trips abroad, the Academy received 118 foreign scientists.

On 1 January 1985, 4,956 workers worked at the Academy of Sciences, of them 1,855 are scientists, among whom there are 107 doctors of sciences and 924 candidates of sciences. The workers who have a scientific degree make up 55.6 percent.

In 1984, 9 doctoral and 58 candidate dissertations were defended. The institutes of the Academy of Sciences admitted 65 graduate students, 70 graduate students completed graduate studies.

The total expenditures of the Academy of Sciences in 1984 came to 22,096,000 rubles, of them 6,410,000 rubles were for scientific research work, 4,150,000 rubles were for the purchase of apparatus and equipment, the expenditures on capital construction came to 4,973,000 rubles, of them 1,606,000 rubles were for construction and installation work.

To execute Decree No 344 of the Presidium of the Academy of Sciences of 30 November 1983 expanded plenary meetings of the Presidium, at which the directors of the institutes of the Academy of Sciences or their deputies delivered reports on the contacts of the institutes with production and their strengthening and acquainted the people with the experience of the institutes in the introduction in production of the results of research, were held monthly.

The speaker also pointed out the shortcomings in the activity of the Academy of Sciences in 1984. In spite of the fact that the work on capital construction improved, the plans are still not being fulfilled. There are difficulties in the performance of work on capital repair, it is necessary to strengthen the construction and repair section of the Academy of Sciences. The transportation fleet of the Academy of Sciences should be updated, the work on material and technical supply, particularly the delivery of computer hardware, chemical reagents, and metal-removal machine tools, should be improved.

After the report on the activity of the Academy of Sciences in 1984 President of the Academy of Sciences Academician Yu. Pozhela presented the honorary degrees and prizes of the Academy of Sciences for the best scientific works.

By Decree No 49 of the Presidium of the Academy of Sciences of 11 February 1985 on the basis of the representation of the Scientific Council of the Institute of History and the results of the vote of the Commission for the Academician Yuozas Zhyugzhda Prize, (Footnote 13) (By Decree No 77 of 10 March 1984, "On the Statute on the Academician Yu. Zhyugzhda Prize," the Presidium of the Lithuanian SSR Academy of Sciences established that this

prize (500 rubles) is awarded once every 3 years for historians not over the age of 33 for the best scientific works--monographs, chapters of collective works, series of articles. Collective (not more than three authors) works can also be submitted for the competition. Academicians, corresponding members of the Lithuanian SSR Academy of Sciences, and scientific councils of scientific institutions and higher educational institutions of the republic can submit works. Works (two copies) are submitted once every 3 years (starting in 1981) by 1 January to the address: 232600, Vilnius, Ulitsa T. Kostyushki 30, the Institute of History of the Lithuanian SSR Academy of Sciences, telephone number 623829. The works are submitted with a letter in which: a scientific description of the work is given, the reasons for submission are indicated; the data on the reviews of the work, which have been published in the press, and the evaluation of it, which was given in them; the surname, name, patronymic, date of birth, academic degree, place of work, position, and home address of the author being nominated for the prize. The Scientific Council of the Institute of History of the Academy of Sciences selects the submitted works. The Competition Committee, which is approved by the Presidium of the Academy of Sciences on the suggestion of the Institute and the representation of the Bureau of the Social Sciences Department, is made up to five people (academicians, corresponding members of the Academy of Sciences, historians from scientific institutions and higher educational institutions of the republic). The decision of the commission is made by secret ballot by a simple majority of votes. The certificates and prizes are presented to the winners at the annual report session of the General Assembly of the Academy of Sciences) as well as the approval of the Bureau of the Social Sciences Department this prize (for the first time) was awarded to Candidate of Historical Sciences Alfonsas Albinovich Eydintas, chief of the Chair of General History of Vilnius State Pedagogical Institute, for the scientific work "The Class Struggle in Lithuania in the Second Half of 1919 and 1920."

By Decision No 14 of the Presidium of the Academy of Sciences and the Komsomol Committee of the Academy of Sciences of 11 February 1985 and on the representation of the commissions of the Competition of Works of Young Scientists (Footnote 14) (By Decision No 46 of the Presidium of the Lithuanian SSR Academy of Sciences and the Komsomol Committee of the Academy of Sciences of 19 November 1984 "On the Competition of Works of Young Scientists of the Academy of Sciences" a new Statute (the competition has been held since 1979) was approved, in which it was established that 3 (according to the number of departments of sciences of the Academy of Sciences) prizes (300 rubles each) are awarded annually to young (not over the age of 33) scientists of the Academy of Sciences, who are the winners of the competition for the best works--publications, reports of scientific works, individual chapters of them, and inventions. Collective works (not more than three authors), among the authors of which there can also be people over the age of 33, if their contribution to the work does not exceed 50 percent, can also be submitted for the competition. The boards of directors of the institutes of the Academy of Sciences submit the works (not more than one a year) on the basis of the recommendation of the Council of Young Scientists of the institute. The works (one copy) are submitted from 1 September to 1 December to the Scientific Organization Department of the Academy of Sciences (telephone number 626601). The works are submitted with a letter, in which: the reason for the submitting of the work is given, a brief description of it and the

recommendations of the Council of Young Scientists of the institute are given; the surname, name, patronymic, date of birth, place of work, position, academic title of the author, a list of his basic works and inventions, home address, and telephone number are indicated. An expert commission made up of five people (among whom one is a member of the Council of Young Scientists of the Academy of Sciences), which were formed by the bureaus of the departments of sciences, by secret ballot determine by a simple majority the winners of the competition. The bureaus of the departments at the meetings discuss the results of the competitions and submit them for the approval of the Presidium of the Academy of Sciences. The certificates and prizes are presented to the winners at the annual report session of the General Assembly of the Academy of Sciences) the following scientific works of 1984 of young scientists of the Academy of Sciences were awarded prizes:

--in the area of the physical, technical, and mathematical sciences--the work of Candidate of Physical Mathematical Sciences Saulys Kachyulis, director of a group of the Institute of Semiconductor Physics, "Hot Electrons of GaAs and InP in Mutually Intersecting Electric and Magnetic Fields";

--in the area of the chemical, technological, and biological sciences--the work of Candidate of Biological Sciences Narimantas Chenas, senior scientific associate of the Institute of Biochemistry, "Quantitative Laws of the Transfer of Electrons in Nicotine Amide Coenzymes and Flavin Enzymes";

--in the area of the social sciences--the work of Algis Kaleda, junior scientific associate of the Institute of the Lithuanian Language and Literature, "Comicality in Lithuanian Soviet Prose."

By Decree No 40 of the Presidium of the Academy of Sciences of 11 February 1985 and on the basis of the representations of the scientific councils of faculties of the higher educational institutions of the republic, as well as the approval of the bureaus of the departments of sciences of the Academy of Sciences the following best scientific works of 1984 of undergraduates of the republic were awarded prizes:

--in the area of the physical, technical, and mathematical sciences--the work of A. Urbshis and R. Vyansas, 5th year students of the Automation Faculty of Kaunas Polytechnical Institute, "The Optimization of the Parameters of Digital Regulators";

--the work of E. Votsyalka, a 4th year student of the Machine Building Faculty of Kaunas Polytechnical Institute, "The Mechanical Properties of Thermostable Polymers at Low Temperatures";

--the work of S. Yershenas, a 5th year student of the Physics Faculty of Vilnius State University, "The Luminescence of Monocrystals of SdSe, Which Have Been Excited by Picosecond Laser Pulses";

--in the area of the chemical, technological, and biological sciences--the work of R. Degutite and Yu. Kozhyanyauskaye, 4th year students of the Chemical Technology Faculty of Kaunas Polytechnical Institute, "The Synthesis and Study of Formations of Pyrimido(1,2-a)indol-2-one";

--the work of R. Bagdonayte, a 5th year student of the Natural Geography Faculty of Vilnius State Pedagogical Institute, "The Generative Propagation of Rhododendrons by Means of Growth Regulators;

--the work of A. Kasyalite, a 5th year student, and D. Gustaynite, a 4th year student of the Natural Science Faculty of Vilnius State University, "The Inhibition Effect of Several Nucleotides on the First Stage of the Legalision [legalizionnaya] Reaction of RNA";

--in the area of the social sciences--the work of R. Shumakarite, a 3rd year student of the Mechanical Technology Faculty of the Vilnius Construction Engineering Institute, "Questions of the Development by Stages of Highways and Railroads."

The academician secretaries of the departments: Academician V. Statulyavichyus of the Physical, Technical, and Mathematical Sciences Department, Academician V. Kontrimavichyus of the Chemical, Technological, and Biological Sciences Department, and Corresponding Member Y. Matsyavichyus of the Social Sciences Department, acquainted the session with the plans of scientific research work for 1985 of the institutes of the Academy of Sciences.

In 1985 the institutes of the Academy of Sciences will elaborate 33 problems and 321 themes (of them 182 themes on 28 problems from the area of the natural and social sciences and 139 scientific and technical themes on 21 problems). The institutes of the Academy of Sciences will begin the elaboration of 90 new themes and will complete the study of 215 themes.

Six people spoke during the discussions on the report on the activity of the Academy of Sciences in 1984 and the plans of scientific research work of the Academy of Sciences in 1985.

Corresponding Member of the Academy of Sciences L. Tyalksnis, deputy director of the Institute of Mathematics and Cybernetics, discussed the problems of the use of computer technology in the system of the Academy of Sciences. The possibilities of the use of computers at the Academy of Sciences will be broadened significantly with the start of the operation of the Elbrus Complex. The improvement of the skills of scientific associates of the Academy of Sciences, which is being carried out at the Institute of Mathematics and Cybernetics, and the training of young programmers will contribute to proper use. However, great differences between institutes are being noticed in this work. The Academy and the Institute of Mathematics and Cybernetics can and will have to join much more extensively in the work on the computerization of the secondary school. It is necessary to devote more attention to the creation of scientific data banks. The need has arisen to solve on the scale of the republic the problems of the use (maintenance, repair) of the pool of computers.

Academician A. Merkis, director of the Institute of Botany, note that the specialization of the Institute of Botany has not yet been completed, and stressed the importance of the organization of basic biological research at the institutes of the Academy for the solution of the practical problems of

agricultural production and the need to unite and cooperate the forces of the Academy of Sciences for the conducting of special-purpose research.

Corresponding Member of the Academy of Sciences A. Kudzis, chief of a chair of the Vilnius Construction Engineering Institute, indicated the importance of the organization in the system of the Academy of Sciences of an institution of the mechanics type, which would solve the very important problems for the national economy of the optimization of the reliability and the automation of the designing of mechanical systems. The forces for this exist at the Academy of Sciences and in the republic, it is necessary to unite them.

Candidate of Philosophical Sciences V. Lazutka, director of the Institute of Philosophy, Sociology, and Law, acquainted the people with the activity of the institute and the problems and prospects of its work. Although the institute is still being formed and consolidated, it already has its own "character" and is valued in the country. Difficulties are arising due to the premises and the weak material base, there is a need for additional terminals of the computer network and duplicating equipment.

Doctor of Biological Sciences G. Paulyukyavichyus, chief of the Laboratory of Landscape Geomorphology and Geochemistry of the Department of Geography, noted that the works of the department now and during the next five-year plan will be closely connected with the solution of the problems of the reclamation and food programs (erosion, the souring of soils, the silting of bodies of water, and so forth). Comprehensive research, which is also being performed during the accomplishment of the "Man and the Biosphere" Program and the solution of the problems of the use and protection of the landscape, is necessary for the successful solution of these problems. The shortage of analysts and field observers is hindering the work.

V. Machyulis, director of the Experimental Plant of the Institute of Physics, discussed the questions of the activity of the plants of the Institute of Physics and other experimental institutes of the Academy of Sciences and indicated the successful start of their activity and the most important achievements and problems. Through these plants researchers constantly associate with production. It is necessary to strengthen the base of the plants and to improve their supply with equipment and materials, new, specialized facilities are needed. It is very important to cooperate the activity of the plants of the Academy of Sciences, then such products, which each plant individually is now not capable of developing and producing, would be developed.

The session of the General Assembly adopted the decree "On the Scientific and Scientific Organizational Activity of the Academy of Sciences in 1984."

In the decree it is stated that the collective of the Academy of Sciences during the 4th year of the 11th Five-Year Plan, in working on the tasks posed for science by the 26th CPSU Congress and the 18th Lithuanian CP Congress, as well as by the CPSU Central Committee Plenums, fulfilled in good time all the plan assignments of scientific research work for 1984.

Significant scientific and scientific organizational work has also been performed on the fulfillment of the decrees of the CPSU Central Committee and the Lithuanian CP Central Committee on the acceleration of scientific and technical progress in the national economy and the increase of the effectiveness of scientific research.

The session approved the report on the activity of the Academy of Sciences in 1984 and commissioned the Presidium of the Academy of Sciences to discuss the questions and suggestions, which were advanced at the session, as well as to envisage specific steps on their implementation.

The session also adopted the decree "On the Plan of Scientific Research Work of the Academy of Sciences for 1985."

In the decree it is stated that during the final year of the 11th Five-Year Plan basic research and scientific and technical research in the basic directions of the scientific work of the Academy of Sciences and the republic will be further developed at the Academy of Sciences, the basic attention will be devoted to the assignments which have been included in the all-union and republic comprehensive programs.

The session endorsed the plan of scientific research work of the Academy of Sciences for 1985 and obliged the bureaus of the departments of sciences, the boards of directors of the institutes, and the full members and corresponding members of the Academy of Sciences to ensure that the collective of the Academy of Sciences would exert all efforts for the realization of the accomplishment of the assignments of the last year of the 11th Five-Year Plan and the tasks which have been posed for science by the party and government. Further the session of the General Assembly discussed organizational questions.

By secret ballot the General Assembly elected Vitautas Antanovich Statulyavichyus vice president of the Academy of Sciences.

The General Assembly approved the directors of the institutes, who were elected by secret ballot at the sessions of the general assemblies of the departments of sciences:

--director of the Institute of Semiconductor Physics--Corresponding Member of the Academy of Sciences Algirdas Yustinovich Shileyka;

--director of the Institute of Economics--Corresponding Member of the Academy of Sciences Eduardas Yonovich Vilkas;

--director of the Institute of Philosophy, Sociology, and Law--Candidate of Philosophical Sciences Valentin Antonovich Lazutka;

--director of the Institute of the Lithuanian Language and Literature--Corresponding Member of the Academy of Sciences Yonas Yonovich Lankutis.

Vitautas Antanovich Statulyavichyus. Born 27 February 1929 in the village of Bikynay of Utyanskiy Rayon.

In 1954 he graduated from the Physics and Mathematics Faculty of Vilnius State University (the specialty "mathematics"). During 1955-1975 he studied in graduate studies of Leningrad University under Academician Yu.V. Linnik. During 1959-1960 he did special course work at Moscow State University under Academician A.N. Kolmogorov.

In 1958 the degree of candidate of physical mathematical sciences (the dissertation theme was "Local Limit Theorems for Heterogeneous Markov Chains") was awarded to V. Statulyavichyus, in 1967--doctor of physical mathematical sciences (the dissertation theme was "Studies of Limit Theorems of Probability Theory), in 1968--the title of professor. On 22 March 1972 he was elected full member (academician) (the specialty "mathematics").

During 1951-1954 V. Statulyavichyus was a senior laboratory assistant and during 1954-1957 an assistant lecturer of the Physics and Mathematics Faculty of Vilnius State University.

During 1957-1959 V. Statulyavichyus was a senior scientific associate of the Institute of Physics and Mathematics of the Lithuanian SSR Academy of Sciences, during 1959-1965--chief of the Mathematics Sector of the Institute of Physics and Mathematics, during 1965-1976--chief of the Sector of Probability Theory of the Institute of Physics and Mathematics, and during 1976-1981--the Institute of Mathematics and Cybernetics.

During 1962-1966 V. Statulyavichyus was deputy director for scientific work of the Institute of Physics and Mathematics, during 1966-1976--director of the Institute of Physics and Mathematics, and since 1976--the Institute of Mathematics and Cybernetics.

Since 15 April 1976 V. Statulyavichyus has been academician secretary of the Physical, Technical, and Mathematical Sciences Department of the Academy of Sciences and a member of the Presidium of the Academy of Sciences.

Since 1954 V. Statulyavichyus has been teaching at Vilnius State University (during 1954-1964--senior instructor, during 1964-1964--docent, and since 1968--professor).

V. Statulyavichyus has published 73 scientific works on questions of probability theory and mathematical statistics and has given lectures at many international conferences and symposiums and at foreign universities and scientific institutions.

Under the supervision and with the consultation of V. Statulyavichyus 33 candidate and 5 doctoral dissertations and more than 100 student graduation and course projects have been prepared.

Since 1975 V. Statulyavichyus has been a member of the Higher Certification Commission and since 1976 a member of the International Statistics Committee. He is a member of the Commission for Probability Theory attached to the Presidium of the USSR Academy of Sciences, chairman of the Commission for Computer Technology attached to the Presidium of the Lithuanian SSR Academy of Sciences, a member of many scientific councils and the All-Union Committee for



Komsomol Prizes, and a member of the editorial boards of the journal of the USSR Academy of Sciences TEORIYA VEROYATNOSTEY I YEYE PRIMENENIYA, the journal of the Ukrainian SSR Academy of Sciences KIBERNETIKA, and the journal LITOVSKIY MATEMATICHESKIY SBORNIK.

During 1970-1984 V. Statulyavichyus was chairman of the Board of the Vilnius City Organization of the Society for Knowledge, since 1984 he has been chairman of the Board of the Lithuanian SSR Society for Knowledge. In 1979 he was awarded the S. Vavilov Prize by the Board of the All-Union Society for Knowledge.

In 1956 the Prize of Leningrad University was awarded to V. Statulyavichyus for the work "Local Limit Theorems for Heterogeneous Markov Chains," in 1966 the Lithuanian SSR State Prize was awarded to him for the series of works "Limit Theorems for Markov Chains and Dependent Random Variables," in 1971 the A.A. Markov Prize of the USSR Academy of Sciences was awarded to him for the series of works "Limit Theorems for Dependent Random Variables and Markov Chains," and in 1979 the USSR State Prize was awarded to him for a series of works in the area of asymptotic methods of probability theory.

Since 1953 V. Statulyavichyus has been a member of the CPSU. He is a member of the Vilnius City Committee of the Lithuanian Communist Party and a member of the Party Committee of the Lithuanian SSR Academy of Sciences, he was a deputy of the 25th CPSU Congress, a member of the Leninskiy Rayon Committee of the Lithuanian Communist Party, and a deputy of the Soviet of People's Deputies of Leninskiy Rayon of Vilnius, and since 1985 has been a deputy of the Lithuanian SSR Supreme Soviet.

V. Statulyavichyus was awarded Honorary Certificates of the Presidium of the Lithuanian SSR Supreme Soviet (1949, 1979), the medal "For Valiant Labor. In Commemoration of the 100th Anniversary of the Birth of V.I. Lenin" (1970), the Order of Labor Red Banner (1971), the Order of the October Revolution (1976), and the Order of Friendship of Peoples (1981). In 1974 the honorary title of Honored Figure of Science of the Lithuanian SSR was conferred on him.

Algirdas Yustinovich Shileyka. Born 1 January 1932 in the city of Ukmyarge.

In 1954 he graduated from the Physics and Mathematics Faculty of Vilnius State University (the specialty "physics"). During 1954-1956 he studied in graduate studies of the Physical Technical Institute and during 1956-1957--the Institute of Physics and Mathematics of the Lithuanian SSR Academy of Sciences.

During 1952-1954 A. Shileyka was a laboratory assistant and during 1954-1955 an assistant lecturer of the Physics and Mathematics Faculty of Vilnius State University.

During 1957-1961 A. Shileyka was a junior scientific associate, during 1961-1962 a senior scientific associate, during 1962-1967 the chief of the Sector of Semiconductor Optics and deputy director for scientific work of the Institute of Semiconductor Physics, and since 1967 has been the chief of the

Sector (since 1968 the Laboratory) of Semiconductor Optics and deputy director for scientific work of the Institute of Semiconductor Physics.

In 1960 A. Shileyka was awarded the degree of candidate of physical mathematical sciences (the dissertation theme was "Several Optical Properties of  $\text{Sb}_2\text{S}_3$  and  $\text{Sb}_2\text{Se}_3$  Layers"), in 1974 the degree of doctor of physical mathematical sciences (the dissertation theme was "Methods of the Modulation Spectroscopy of the Energy-Band Structure of Semiconductors"), and in 1977 the title of professor.

On 16 October 1980 A. Shileyka was elected a corresponding member of the Lithuanian SSR Academy of Sciences (the specialty "physics"). Since 19 February 1981 he has been deputy academician secretary of the Physical, Technical, and Mathematical Sciences Department.

Since 1954 A. Shileyka has been teaching at Vilnius State University.

A. Shileyka has published more than 125 scientific articles and is a coauthor of the monograph "Mnogodolinnyye poluprovodniki" [Multiple-Valley Semiconductors] (1978). He has delivered more than 70 reports at international, all-union, and republic conferences.

Under the supervision of A. Shileyka nine candidate dissertations have been defended, one has been prepared defense, and four are being prepared.

A. Shileyka is a member of several scientific and problem councils, deputy chairman of the Council for Scientific and Technical Information attached to the Presidium of the the Lithuanian SSR Academy of Sciences and the Board of the Lithuanian SSR Society of Physicists, a member of the editorial board of the journal LITOVSKIY FIZICHESKIY SBORNIK, and chairman of the Board of the Organization of the Society for Knowledge of the Academy of Sciences.

Since 1959 A. Shileyka has been a member of the CPSU. He is deputy secretary of the Party Committee of the Academy of Sciences.

In 1974 A. Shileyka was awarded the Lithuanian SSR State Prize for the series of works "The Study of Semiconductors by the Methods of Modulation Spectroscopy (1966-1973)."

A. Shileyka was awarded Honorary Certificates of the Presidium of the Lithuanian SSR Supreme Soviet (1965, 1974) and the medal "For Valiant Labor. In Commemoration of the 100th Anniversary of the Birth of V.I. Lenin." In 1983 the honorary title of Honored Figure of Science of the Lithuanian SSR was conferred on him.

Eduardas Yonovich Vilkas. Born 3 October 1935 in the city of Gargzhday of Klaypedskiy Rayon.

In 1958 he graduated from the Physics and Mathematics Faculty of Vilnius State University. During 1959-1962 he studied in graduate studies of the Institute of Physics and Mathematics of the Lithuanian SSR Academy of Sciences.

During 1958-1959 and 1962-1964 E. Vilkas was a junior scientific associate, during 1964-1967 chief of the Sector of Computer Mathematics, during 1967-1976 chief of the Sector (since 1980 the Department) of the Study of Operations, and simultaneously since 1979 has been deputy director for scientific work of the Institute of Mathematics and Cybernetics.

Since 1 February 1985 E. Vilkas has been director of the Institute of Economics and at the same time has been in charge of the Department of the Study of Operations, which was transferred from the Institute of Mathematics and Cybernetics to the Institute of Economics.

In 1963 E. Vilkas was awarded the degree of candidate of physical mathematical sciences (the dissertation theme was "Functional Properties of the Value of a Game") and in 1976 the degree of doctor of physical mathematical sciences (the dissertation theme was "The Principles of Optimality of Game Theory") and the title of professor.

On 16 October 1980 E. Vilkas was elected a corresponding member of the Lithuanian SSR Academy of Sciences (the specialty "mathematics").

Since 1958 E. Vilkas has been teaching at Vilnius State University.

E. Vilkas has published on questions of game theory, mathematical economics, decision-making theory, and probability theory more than 50 scientific articles, as well as the monographs "Chto takoye teoriya igr?" [What Is Game Theory?] (1976), "Matematicheskiye metody v ekonomike" [Mathematical Methods in Economics] (1980), "Resheniya: teoriya, informatsiya, modelirovaniye" [Decisions: Theory, Information, Modeling] (jointly with Ye.Z. Mayninas, 1981), and "Optimalnost v igrakh i resheniyakh" [Optimality in Games and Decisions] (it is being published by the Nauka Publishing House of the USSR Academy of Sciences).

Under the supervision of E. Vilkas 13 candidate dissertations have been prepared.

E. Vilkas is a member of the editorial board of THE INTERNATIONAL JOURNAL OF GAME THEORY (Austria). He supervises the republic seminar "Mathematical Methods in the Social Sciences" and edits the serial of the same name, which has been published by the Institute of Mathematics and Cybernetics since 1971.

Since 1959 E. Vilkas has been a member of the CPSU. He is a member of the Leninskiy Rayon Committee of the Lithuanian Communist Party of Vilnius and secretary of the Party Committee of the Academy of Sciences.

In 1977 E. Vilkas was awarded the Lithuanian SSR State Prize for the series of works "The Problem of Optimality in Game Theory."

E. Vilkas was awarded the medals "For Valiant Labor. In Commemoration of the 100th Anniversary of the Birth of V.I. Lenin" (1970) and "For Labor Valor" (1981). In 1981 the honorary title of Honored Figure of Science of the Lithuanian SSR was conferred on him.

Valentin Antonovich Lazutka. Born 3 April 1932 in the village of Baysogalovo of Vengerovski Rayon of Novosibirsk Oblast.

In 1955 he graduated from the Philosophy Faculty of Moscow State University (the specialty "philosophy"). During 1955-1958 he studied in graduate studies of Moscow State University.

In 1955 V. Lazutka was an assistant lecturer, during 1958-1962 an instructor of the Chair of Dialectical and Historical Materialism of Vilnius State University, during 1962-1965 a senior instructor of the Chair of Marxism-Leninism of the Vilnius Affiliate of Kaunas Polytechnical Institute, during 1965-1972 a docent of the Chair of Philosophy of the Moscow Cooperative Institute (the Vilnius Educational Consultation Center), during 1972-1974 a senior instructor of the Chair of Philosophy of the Lithuanian SSR Academy of Sciences, during 1974-1978 a senior instructor, during 1980-1984 a senior scientific associate, during 1981-1984 a docent, and in 1984 an acting professor of the Chair of Marxism-Leninism of the Vilnius Higher Party School.

Since 25 December 1984 V. Lazutka has been director of the Institute of Philosophy, Sociology, and Law of the Academy of Sciences.

In 1962 V. Lazutka was awarded the degree of candidate of philosophical sciences (the dissertation theme was "Religion as a Form of the Fantastic Reflection of Reality") and in 1965 the title of docent. In 1984 he defended the dissertation for the degree of doctor of philosophical sciences (the dissertation theme was "Nationalism in the Modern System of Anticommunism. A Critique of the Sociopolitical Content of the Baltic Reactionary Emigration").

V. Lazutka has published more than 45 scientific articles, the monographs "Krizis burzhuaznoy ideologii" [The Crisis of Bourgeois Ideology] (1963) and "Kritika burzhuaznogo natsionalizma i internatsionalnoye vospitaniye. Voprosy teorii" [The Criticism of Bourgeois Nationalism and International Education. Questions of Theory] (1982), and eight pamphlets, is the coauthor of three monographs, and has given reports at all-union and republic conferences.

Since 1958 V. Lazutka has been a member of the CPSU. He was secretary of the party organization of instructors and employees of the Vilnius Higher Party School and is a nonstaff lecturer of the Lithuanian CP Central Committee, a member of the Scientific Methods Council of the House of Party Education of the Lithuanian CP Central Committee, and deputy chairman of the Scientific Methods Council for the Study of National Relations of the Institute of History of the Academy of sciences.

In 1982 the honorary title of Honored Figure of Culture of the Lithuanian SSR was conferred on V. Lazutka. In 1982 he was awarded the medal "Veteran of Labor."

Yonas Yonovich Lankutis. Born 8 February 1925 in the city of Gargzhday of Klaypedskiy Rayon.

In 1953 he graduated from the History and Philology Faculty of Vilnius State University (the specialty "the Lithuanian language and literature"). During

1953-1956 he studied in graduate studies of the Institute of World Literature imeni M. Gorkiy of the USSR Academy of Sciences.

During 1947-1948 Y. Lankutis was chief of the Department of Culture and Education of the editorial board of the Klaypedskiy Rayon newspaper RAUDONASIS SHVITURIS and during 1950-1953 chief of the Department of Criticism of the weekly LITERATURA IR MYANAS.

During 1956-1957 Y. Lankutis was a junior scientific associate of the Sector of Soviet Lithuanian Literature of the Institute of the Lithuanian Literature and Language of the Lithuanian SSR Academy of Sciences and since 1957 has been the chief of this sector.

Since 15 November 1984 Y. Lankutis has been director of the Institute of the Lithuanian Language and Literature and at the same time chief of the Department of Soviet Lithuanian Literature.

In 1956 Y. Lankutis was awarded the degree of candidate of philological sciences (the dissertation theme was "The Problem of Conflict and Character in Lithuanian Soviet Drama") and in 1976 the degree of doctor of philological sciences (the dissertation theme was "The Development of Lithuanian Drama").

On 15 April 1976 Y. Lankutis was elected a corresponding member of the Lithuanian SSR Academy of Sciences (the specialty "literary criticism").

Y. Lankutis has published on urgent questions of Lithuanian drama, the development of Lithuanian Soviet literature, and the theory of literature more than 300 articles and reviews in the republic, all-union, and foreign press and 20 books, among which are: the collections of articles "Litovskaya dramaturgiya" [Lithuanian Drama] (1958), "Sotsialisticheskiy realizm v litovskoy literature" [Socialist Realism in Lithuanian Literature] (1959), "Literatura i gumanisticheskiye idealy" [Literature and Humanistic Ideals] (1963), and "Litovskaya sovetskaya dramaturgiya" [Lithuanian Soviet Drama] (1983) and the monographic essays and studies "Tvorchestvo V. Mikolaytisa-Putinas" [The Works of V. Mikolaytis-Putinas] (1961, 1973), "Poeziya E. Mezhelaitisa" [The Poetry of E. Mezhelaitis] (1965, 1971), "Razvitiye litovskoy dramaturgii" [The Development of Lithuanian Drama] (1974, 1979), "Panorama litovskoy sovetskoy literatury" [A Panorama of Lithuanian Soviet Literature] (1975), "Poeticheskiy mir Yustinas Martsinkyavichyusa" [The Poetic World of Yustinas Martsinkyavichyus] (1980), and "Etyudy ob Yuozae Grushase" [Studies on Yuoza Grushas] (1981).

Y. Lankutis is one of the authors, a supervisor, and an editor of many fundamental collective publications of the Institute of the Lithuanian Language and Literature. He participated in preparation of the four-volume (five books) academic "Istoriya litovskoy literatury" [The History of Lithuanian Literature] (1957, 1958, 1961, 1965, 1968) and was one of the authors and the editor in chief of the publications "Velikaya Oktyabrskaya sotsialisticheskaya revolyutsiya i litovskaya literatura" [The Great October Socialist Revolution and Lithuanian Literature] (1967), "Istoriya litovskoy literatury" [The History of Lithuanian Literature] (in Russian, 1977), and the

two-volume "Istoriya litovskoy literatury" [The History of Lithuanian Literature] (1979, 1982).

Y. Lankutis is the author and a coauthor of many sections on Lithuanian literature of the multivolume publications of the Institute of World Literature imeni M. Gorkiy "Istoriya mirovoy literatury" [The History of World Literature], "Istoriya mnogonatsionalnoy sovetskoy literatury" [The History of Multinational Soviet Literature], and its other publications.

Since 1958 Y. Lankutis has been a member of the Lithuanian SSR Union of Writers and since 1965 has been a member of its Board and the Presidium of the Board. He is a member of the editorial board of the journal PYARGALE.

Since 1960 Y. Lankutis has been a member of the CPSU. He was a member of the Party Committee of the Academy of Sciences.

In 1969 for the work "Istoriya litovskoy literatury. Toma I-IV" [The History of Lithuanian Literature. Volumes I-IV], as a member of the collective of authors, and in 1976 for the monograph "Razvitiye litovskoy dramaturgii" (1974) Y. Lankutis was awarded the Lithuanian SSR State Prize.

Y. Lankutis was awarded the medal "For Labor Distinction" (1981) and Honorary Certificate of the Presidium of the Lithuanian SSR Supreme Soviet (1985). In 1975 the honorary title of Honored Figure of Science of the Lithuanian SSR was conferred on him.

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AUTOMATION AND INFORMATION POLICY

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CONTROL OF EXTREME STATES OF ELECTRIC POWER SYSTEMS

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B in Russian No 5,  
Sep-Oct 85 pp 65-66

[Abstract of article by M.Yu. Bloznyalis and A.V. Rishkinis "A Model System of the Control of Extreme States of Electric Power Systems (3. The Use of Large System Description Language for the Development of the Adviser of the Dispatcher of Electric Power Systems)," TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA B, Vol 5(150), 1985, pp 51-66]

[Text] Several peculiarities of large system description language (YaPISS) as applied to the description of an electric power system (EES) are suggested and studied.

The dictionary reflects the three basic components of the description of the state of the system: the topological relations of the objects in the system, the energy state of the system, and the information state, that is, a set of information on events which require increased attention of the dispatcher.

The basic groups of concepts are distinguished in the dictionary: B--the group of concepts of the switching state, O--the group of concepts of the operating state, Z--the group of indicators of the disturbance of the given mode, A, M--the groups of indicators of the state of the protection devices and automatic equipment. The information state owing to its importance is represented everywhere as the cortege <BOZAM>.

An example of the construction of a description in the language of hierarchically connected grammars, which is accomplished by the uniting of these concepts in the form of individual grammars and the formation of a hierarchical structure of these grammars, is cited. The advisability of using base symbols for the reflection of various aspects of the information state of the objects, which are united into <BOZAM> corteges, is shown. The mechanism of the operation of the system of operators for the obtaining of fragments of the description of the given components of the system is shown on the basis of the cited examples, moreover, the composition and size of the description are formed automatically subject to the type of used operator.

Tables--2, illustrations--4, bibliography--3.

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## CONFERENCES AND EXPOSITIONS

### PLENUM OF UKRAINIAN BOARD OF ECONOMIC SCIENCE SOCIETY

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 10, Oct 85 pp 95-96

[Article by A. Izotenko, deputy chairman of the Ukrainian Republic Board of the Economic Science Society: "The 8th Plenum of the Ukrainian Republic Board of the Economic Science Society"]

[Text] The plenum of the Ukrainian Republic Board of the Economic Science Society, which considered the question "On the Participation of the Organizations of the Economic Science Society on the Formulation of the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences for 1991-2010 for the Ukrainian SSR," was held on 18 May 1985 in Donetsk.

Academician of the Ukrainian SSR Academy of Sciences N.G. Chumachenko, director of the Institute of Industrial Economics of the Ukrainian SSR Academy of Sciences, delivered the report. (Footnote 1) (A paraphrase of the report is printed in this issue of the journal)

Ye.M. Yevsyukov, deputy chairman of the Donetsk Oblast Soviet Executive Committee and chairman of the Oblast Planning Commission, who described the state of scientific and technical progress in Donetsk Oblast and dwelled on the work of the planning organs of the oblast on the Comprehensive Program of Scientific and Technical Progress of the Region and the participation in this work of the economic science community, spoke during the discussion of the report.

The basic means of strengthening the orientation of scientific and technical progress toward the increase of the efficiency of social production, which the Comprehensive Program should include, were noted in the statement of N.S. Gerasimchuk, a member of the presidium of the Ukrainian Republic Board of the Economic Science Society and deputy director of the Institute of Economics of the Ukrainian SSR Academy of Sciences. The efforts of the economic science community of the republic, as the speaker emphasized, should be aimed at the elaboration of these means, including, first of all, the determination of the directions of investment, structural, and technical policy in the sectors and regions, on the basis of the tasks posed by the April (1985) CPSU Central Committee Plenum.



Having noted the definite experience in forecasting and the formulation of scientific and technical goal programs, G.M. Dobrov, a member of the presidium of the republic board of the Economic Science Society and deputy chairman of the Council for the Study of the Productive Forces of the Ukrainian SSR of the Ukrainian SSR Academy of Sciences, emphasized the need for the formulation of a program to 2017--the century mark of our country. It is important to unite the efforts of specialists of different types and to enlist sectorial scientific and technical societies for the thorough analysis and extensive search for reserves of production. The speaker also proposed to hold a competition for the best scientific study, the results of which will be included in the Comprehensive Program, or procedural development.

A.S. Redkin, a member of the auditing commission of the republic board of the Economic Science Society and prorektor of the Odessa Institute of the National Economy, told about the experience of the implementation of goal program forms and methods of the management of the national economy, which has been gained in Odessa Oblast. He emphasized that the role of the economic science society should consist in the improvement of the economic and financial support of scientific and technical programs by the conducting of extensive scientific discussions and economic experiments.

While revealing the state of the information base of the support of comprehensive scientific and technical programs, M.V. Daragan, deputy chairman of the section "Statistics" of the Republic Board of the Economic Science Society and deputy director of the Ukrainian Affiliate of the Scientific Research Institute of the USSR Central Statistical Administration, in his statement proposed to the primary organizations of the Economic Science Society of planning organs and institutes of the economic type when working on the Comprehensive Program to promote more actively the improvement of the information base of research, taking into account the need for the reduction of the paper flow when formulating the program.

V.Ya. Mashtabey, chairman of the section of the economics of scientific and technical progress of the Republic Board of the Economic Science Society and chief of a sector of the Institute of Socioeconomic Problems of Foreign Countries of the Ukrainian SSR Academy of Sciences, proposed to specify in the decree of the plenum the basic directions in the formulation of the Comprehensive Program for each scientific section of the Economic Science Society.

Summarizing the discussion, G.V. Dzis, chairman of the Ukrainian Republic Board of the Economic Science Society and deputy chairman of the Ukrainian SSR State Planning Committee, noted the great importance of the formulation of the Comprehensive Program of Scientific and Technical Progress and Its Socioeconomic Consequences for 1991-2010 and the role of the economic science society of the republic in this matter. The interdepartmental nature of the organizations, which belong to the Economic Science Society and have within them highly skilled economists, is making it possible to elaborate and include in this program economically sound, highly efficient decisions. The broadening of the creative participation of the organizations of the Economic Science Society is making it possible to identify not only significant reserves of the successful formulation of the program, but also its use in

economic planning practice. The attachment of the scientific sections to the problem directions of the formulation of the program will make it possible to unite scientific foresight with direct economic experience.

The importance of the uniting of the efforts on the formulation of the program of the organizations of the economic science society and scientific and technical societies was emphasized in the statement of the chairman of the Republic Board of the Economic Science Society. This would contribute to the broadening of the comprehensive approach to forecasting and the strengthening of the interaction of the members of the societies with the immediate developers of the program.

The plenum participants adopted the corresponding decree.

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## AWARDS AND PRIZES

## BRIEFS

LENINGRAD STATE PRIZE WINNERS--Doctor of biological sciences Galina Nikolayevna Mozhayeva, chief of a sector of the Institute of Cytology of the USSR Academy of Sciences. The prize was awarded for the series of works "Neurotoxins as Tools in the Study of Molecular Mechanisms of Nerve Pulse Generation," which were published during 1973-1983. Doctor of medical sciences Vitaliy Aleksandrovich Khilko, chief of a chair of the Military Medical Academy imeni S.M. Kirov. Doctor of medical sciences Boris Aleksandrovich Samotokin, professor-consultant of the Military Medical Academy imeni S.M. Kirov. Doctor of medical sciences Boris Mikhaylovich Nikiforov, professor of the Leningrad Pediatric Medical Institute. The prize was awarded for the development and introduction in practice of methods of the surgical treatment of aneurisms of vessels of the brain. [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 6 Dec 85 p 1] 7807

POZHELA RECEIVES AWARDS--Ukase of the Presidium of the USSR Supreme Soviet. On the Conferment on Comrade Yu.K. Pozhela of the Title of Hero of Socialist Labor. For great services in the development of physical science and the training of scientists and in connection with his 60th birthday to confer on President of the Lithuanian SSR Academy of Sciences Comrade Yuras Karlovich Pozhela the title of Hero of Socialist Labor with the presentation to him of the Order of Lenin and the Hammer and Sickle Gold Medal. [Signed] Chairman of the Presidium of the USSR Supreme Soviet A. Gromyko. Secretary of the Presidium of the USSR Supreme Soviet T. Menteshashvili. Moscow, the Kremlin. 4 December 1985. [Text] [Moscow PRAVDA in Russian 5 Dec 85 p 1] 7807

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## BIOGRAPHICAL INFORMATION

### ARON YAKOVLEVICH BOYARSKIY OBITUARY

Moscow EKONOMIKA I MATEMATICHESKIYE METODY in Russian Vol 21, No 5, Sep-Oct 85  
p 959

[Article: "Aron Yakovlevich Boyarskiy"]

[Text] Soviet economic science has suffered a serious loss. Professor Aron Yakovlevich Boyarskiy--a prominent Soviet economics scholar, an honored figure of science of the RSFSR, and chief of the Chair of Mathematical Methods of the Analysis of the Economy of the Economics Faculty of Moscow State University--died on 6 May 1985.

A.Ya. Boyarskiy was born in 1960 in the family of an employee. During the postrevolutionary years he was raised in a children's home. In 1926 he graduated from the Statistics Department of the Social Sciences Faculty of Moscow State University and began to work at the Communist Academy, while in 1927 he transferred to the USSR Central Statistical Administration. Since that time A.Ya. Boyarskiy performed much teaching work at higher educational institutions: the Moscow Institute of the National Economy imeni G.V. Plekhanov (1927-1930), the Planning Institute (1930-1933), the Institute of Red Professors, the Cooperative Institute, and others. From 1933 to 1945 A.Ya. Boyarskiy was deputy director of the Moscow Institute of Economics Statistics, of which he was one of the organizers; here Aron Yakovlevich was in charge of the Statistics Chair, and then the Demography Chair. Since 1953 A.Ya. Boyarskiy worked at the Statistics Chair of the Economics Faculty of Moscow State University--first as a professor, while from 1964 to 1983 as chief of this chair. He was one of the initiators of the establishment of the Department of Economic Cybernetics at the Economics Chair of Moscow State University, while since 1983 was chief of the Chair of Mathematical Methods of the Analysis of the Economy. A.Ya. Boyarskiy was one of the organizers of the Scientific Research Institute of the USSR Central Statistical Administration, while from 1963 to 1979 was its director.

Aron Yakovlevich Boyarskiy is an economics scholar of broad creative versatility. The search for new means of the development of statistical theory and practice under the conditions of the socialist economy at different stages of development found reflection in his works. One of his first published works (1928) was devoted to the theory of means and became classical in this section of statistics. The contribution of A.Ya. Boyarskiy to the

theory of indices and dynamic series, the theory of correlation analysis, the statistics of product quality, environmental statistics, and the elaboration of questions of the connection of statistics and national economic planning is significant. A.Ya. Boyarskiy was the first to state in a systematized manner the principles of Soviet demography as the science of the main productive force of society--the population, as well as developed the most important aspects of demographic statistics.

Already in his early publications A.Ya. Boyarskiy came forth as an ardent advocate of the introduction of mathematical methods in economics and statistics and outlined means of their use. Aron Yakovlevich made a large contribution to mathematical economic modeling, in particular, to the quantitative analysis of expanded reproduction and the determination of balanced rates of economic growth, the theoretical elaboration of various aspects of the statistical and dynamic models of the intersectorial balance, their use in the measurement of the total expenditures of labor in pricing, in case of the development of the index of national economic efficiency; to the study of the problems of optimum planning and the general theoretical principles of the application of mathematics in economics.

Among the books of A.Ya. Boyarskiy one should single out such ones as "Teoriya matematicheskoy statistiki" [The Theory of Mathematical Statistics] (1930, 1931, in collaboration), "Kurs demograficheskoy statistiki" [A Course of Demographic Statistics] (1945), "Demograficheskaya statistika" [Demographic Statistics] (1951, 1955), "Matematika dlya ekonomistov" [Mathematics for Economists] (1957, 1961), "Matematiko-ekonomicheskiye ocherki" [Economic Mathematical Studies] (1962), "Obshchaya teoriya statistiki" [The General Theory of Statistics] (1977, in collaboration), "Statistika i optimalnoye planirovaniye" [Statistics and Optimum Planning] (1977), and "Matematicheskiye metody analiza ekonomiki" [Mathematical Methods of the Analysis of the Economy] (1983). The article of A.Ya. Boyarskiy "On the Optimum Ratio of the Subdivisions of Social Production" (1965) was published in the first issue of our journal. A number of his books and articles have been republished abroad.

While director of the Scientific Research Institute of the USSR Central Statistical Administration, A.Ya. Boyarskiy directed all his efforts at the solution of the problems connected with the reorganization of the management of the national economy and with the changeover to the Automated System of State Statistics. A.Ya. Boyarskiy was an active participant in and organizer of the all-union censuses. For the scientific supervision of the 1959 USSR census he was awarded the Order of Labor Red Banner. For the development of the methodological principles of the 1970 all-union census A.Ya. Boyarskiy was again awarded the Order of Labor Red Banner. He performed much public scientific work, being a member of the Scientific Methods Council of the USSR Central Statistical Administration, deputy chairman of the Scientific Council of the USSR Academy of Sciences for Demographic Problems, chairman of the Statistics Section of the House of Scientists, and a member of the International Statistics Institute.

Adherence to party principles, conviction, pugnacity, sensitivity, responsiveness, and benevolence were characteristic of Aron Yakovlevich. The memory of him will be preserved forever in the hearts of his comrades.

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BIOGRAPHICAL INFORMATION

DMITRIY SERGEYEVICH KORZHINSKIY OBITUARY

Moscow IZVESTIYA in Russian 20 Dec 85 p 6

[Article: "Academician Dmitriy Sergeyevich Korzhinskiy"]

[Text] Soviet science has suffered a serious loss.

On 16 December 1985 Dmitriy Sergeyevich Korzhinskiy, a prominent Soviet geology scholar, Hero of Socialist Labor, winner of the Lenin Prize and State Prizes, and full member of the USSR Academy of Sciences, died at the age of 86 after a serious and lengthy illness.

D.S. Korzhinskiy was born on 13 September 1899 in the family of Academician of the Russian Academy of Sciences S.I. Korzhinskiy, a prominent botany scholar. After graduating in 1926 from the Leningrad Mining Institute his labor activity at geological institutions of the country began. While working at the All-Union Geological Institute (the Geology Committee), he conducted major geological and petrological studies in Kazakhstan and Eastern Siberia. From 1937 to the end of his days he worked at the Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry of the USSR Academy of Sciences and was one of the organizers and the first director of the Institute of Experimental Mineralogy of the USSR Academy of Sciences.

D.S. Korzhinskiy made an invaluable contribution to the development of mineralogy, petrology, and geochemistry. He formulated the thermodynamic theory of natural systems, developed the principles of the theory of metamorphic and metasomatic processes, and founded and developed a new scientific school--physical chemical petrology. Academician D.S. Korzhinskiy was a member of many foreign academies and societies. He was awarded the Lenin Prize, USSR State Prizes, and many nominal awards.

D.S. Korzhinskiy always combined theoretical work with the demands of practice. His predictions led to the discovery of the Aldan phlogopite deposits. He conducted basic research of skarn deposits--a most important source of mineral raw materials.

The progressive scientific ideas of D.S. Korzhinskiy enabled him to establish a scientific school. Among his students there are many outstanding scientists

who are members of the USSR Academy of Sciences and the academies of sciences of the union republics.

A man of high moral qualities, who was tolerant of the opinion of others, tactful, had a gentle humor and wit, generously dispensed his ideas, was democratic in science and administrative management, was obliging to the highest degree and inwardly organized--such was Dmitriy Sergeyevich Korzhinskiy.

The homeland appreciated the services of D.S. Korzhinskiy, having conferred on him the title of Hero of Socialist Labor and having awarded him two Orders of Lenin, the Order of the October Revolution, three Orders of Labor Red Banner, and many medals. The blessed memory of the fine scientist and citizen will remain forever in the hearts of Soviet geologists.

[Signed] The Presidium of the USSR Academy of Sciences, the USSR Ministry of Geology, the Geology, Geophysics, Geochemistry, and Mining Sciences Department of the USSR Academy of Sciences, the Institute of Geology of Ore Deposits, Mineralogy, Geochemistry, and Petrography of the USSR Academy of Sciences, the Institute of Experimental Mineralogy of the USSR Academy of Sciences

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## BIOGRAPHICAL INFORMATION

### ABIKEN BEKTUROVICH BEKTUROV OBITUARY

Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 25 Dec 85 p 3

[Article: "Abiken Bekturovich Bekturov"]

[Text] Kazakhstan science has suffered a serious loss. Abiken Bekturovich Bekturov, a prominent chemistry scholar, an academician of the Kazakh SSR Academy of Sciences, one of the founders of the republic Academy of Sciences, an honored figure of science of the Kazakh SSR, doctor of technical sciences, professor, and member of the CPSU since 1944, died on 22 December 1985 at the age of 83 after a serious and lengthy illness.

A.B. Bekturov was born on 25 December 1901. He began his labor activity in 1917 as a land surveyor, then worked as chief of the Land Department of the Pavlodar Uyezd Revolutionary Committee and manager of a land management party of the Semipalatinsk Land Administration of the republic People's Commissariat of Agriculture. After graduation from Omsk Agricultural Institute and graduate studies at the Central Asian State University in Tashkent A.B. Bekturov starting in 1935 participated fully in pedagogical, scientific, and public activity in Alma-Ata. He was the first dean of the Chemistry Faculty of the Kazakh State University imeni S.M. Kirov and for more than 20 years was in charge of the Chair of General and Inorganic Chemistry of this higher educational institution. He made a significant contribution to the training of scientists and educators and laid a firm foundation of Kazakhstan chemical science.

Starting in 1942 A.B. Bekturov was in charge of a laboratory of the Chemical and Metallurgy Institute of the Kazakh Affiliate of the USSR Academy of Sciences, while after the founding of the Kazakh SSR Academy of Sciences was appointed director of the Institute of Chemical Sciences, which was organized in 1945 and which he headed for nearly a quarter century. He successfully combined active scientific and pedagogical work with scientific organizational activity and for many years was a member of the presidium and academician secretary of the Mineral Resources Department of the Kazakh SSR Academy of Sciences.

A.B. Bekturov was the founder of the Kazakhstan scientific school of phosphate chemists, by his works he actively contributed to the formation and development of the chemical industry in the republic. The scientific talent



of A.B. Bekturov was revealed especially vividly in connection with the solution of the problem of the phosphorites of Karatau. He was one of the developers of the technology of the production of fodder defluorinated phosphates at the Dzhambul Superphosphate Plant. Promising fertilizers of prolonged action based on polymer phosphates and new techniques of obtaining phosphorus and phosphoric acid are also connected with his name. Many operations, which were performed under the supervision of A.B. Bekturov, were devoted to the chemistry of natural salts and to salt formation in various bodies of water of Kazakhstan.

A.B. Bekturov was the author of numerous scientific works, including a number of monographs, he trained doctors and candidates of sciences. Enormous spiritual generosity, modesty, the capacity for scientific foresight, and paternal care for young people won A.B. Bekturov great respect and authority among chemists of the republic.

For outstanding scientific services to the homeland A.B. Bekturov was awarded the Orders of Lenin and the October Revolution, the Badge of Honor, and medals of the USSR.

The blessed memory of Abiken Bekturovich Bekturov--a prominent scientist, communist, and remarkable man--will be preserved forever in our hearts.

[Signed] D.A. Kunayev, Ye.F. Bashmakov, V.A. Grebenyuk, Z.K. Kamalidenov, O.S. Miroshkhin, S. Mukashev, N.A. Nazarbayev, A.P. Rybnikov, K.T. Turysov, M.M. Akhmetova, A.N. Hurushev, S.T. Temirbekov, M.S. Mendybayev, G.V. Shuliko, A.M. Kunayev, K.N. Naribayev, Ye.V. Gvozdev, Z.A. Akhmetov, Sh.Sh. Ibragimov, S.M. Kozhakhmetov, N.K. Nadirov, B.A. Zhubanov, U.A. Dzholdasbekov, S.K. Kenesbayev, D.V. Sokolskiy, Sh.Ch. Chokin, B.V. Suvorov

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